NOVEMBER, 1950

Railway Engineering and Maintenance

these "Maintenance Men" work "for free"

The Edgemark Of Quality

- Using Reliance Hy-Pressure Hy-Crome Spring Washers on your track joint bolts is like having a maintenance man at each joint ready to tighten each nut the instant looseness develops.
- The powerful, calibrated coil-spring action of Reliance Hy-Pressure Hy-Crome Spring Washers keeps the bolts under constant tension — instantly, automatically, "taking up" looseness resulting from wear, bolt stretch or temperature changes.
- Less frequent maintenance tightening is required, joint deterioration is slowed up, maintenance costs are reduced.
- Reliance Hy-Pressure Hy-Crome Spring Washers are scientifically designed and produced to meet each specific service requirement and for each bolt size—made from cold drawn alloy steel uniformly heat treated and produced with or without ground deflection.
- For proof, install Reliance Hy-Pressure Hy-Crome Spring Washers on your toughest stretch of track. The result will confirm the decision of other American and foreign railroad systems.

®

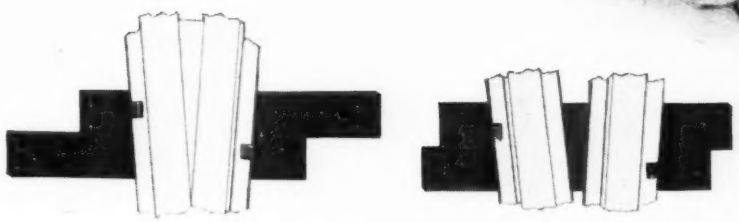
EATON

RELIANCE HY-PRESSURE HY-CROME SPRING WASHERS

ATON MANUFACTURING COMPANY **RELIANCE DIVISION, MASSILLON, OHIO**

Sales Offices: New York, Cleveland, Detroit, Chicago, St. Louis, San Francisco, Montreal

YES INDEED, YOU CAN SHIFT THEM AROUND!



Standard Twin Hook Frog Plates are available in 23-, 27-, and 31-in. lengths.

Bethlehem Twin Hook Frog Plates are always used in pairs, the two units of every pair being exactly alike. Each plate is equipped with an integral forged hook, and any mating pair can be used at several *different* tie positions. Reason: the distance between hooks can be altered at will because of the twin-plate feature.

Thus you don't need to have a special plate here, and another one there, and another one there. You don't need to stock a large and confusing variety of plates, one for every position.

But there are other advantages, too. The big, strong hooks are larger and sturdier than ordinary spike heads. Side thrust and lifting won't budge them. Furthermore, they lessen pull on the spikes themselves; help prevent early tie destruction.

Ask a Bethlehem man for full details; ask him to show you an installation. The plates are so widely used that there are probably a good many near you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

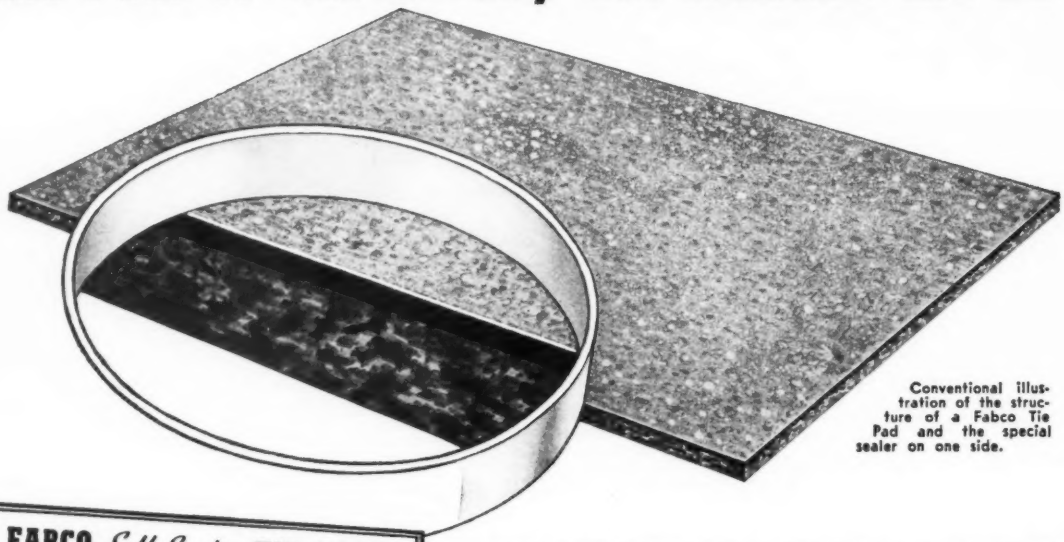
BETHLEHEM STEEL

BETHLEHEM TWIN HOOK FROG PLATES

Published monthly by Simmons-Boardman Publishing Corporation, 79 W. Monroe St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00 for one year; $3.00 for two years. Single copies 50 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Marion, Ind., post office. Address communications to 79 W. Monroe St., Chicago 3, Ill. Volume 46, No. 11.

FABCO *Self-Sealing* TIE PADS

Bind Pads to Ties to Keep Out Moisture and Dirt



Conventional illustration of the structure of a Fabco Tie Pad and the special sealer on one side.

FABCO *Self-Sealing* TIE PADS effectively seal out moisture and dirt between the pad and the tie.

Coated only on the side next to the tie. Freedom of movement of the tie plate is permitted with less disturbance to the tie bond.

Special coating is firmly adhered chemically to the pad without decreasing the strength or resilience of the pad.

Sealing agent is specially compounded to withstand extremes of temperature in both summer and winter.

Self sealing pads require no more labor for installation than regular Fabco Tie Pads.

OVER THE YEARS Fabco Tie Pads of resilient rubber and cotton fibre have demonstrated their ability to prevent mechanical wear of ties through elimination of plate cutting, and give long life service as well.

MAINTENANCE OF WAY departments suggested that if Fabco Tie Pads could be bonded to the tie so as to prevent intrusion of moisture or dirt between tie and pad, their effectiveness might be further increased under certain conditions. After exhaustive tests we announce a tie pad sealer that we are confident is superior to anything yet offered . . . Applied to Fabco Tie Pads before shipment it consists of a 1/16" coat of sealing compound on the side of the pad next to the tie. Since tie plates tend to move under traffic, it is advisable not to bond the pad to the plate, but leave the plate free to move, — greatly reducing any tendency to break the seal between the bottom of the pad and the tie . . . Same standard and special sizes as unsealed Fabco Tie Pads, but 5/16" thick instead of ¼".

For Maximum Protection Against Mechanical Wear of Ties
Use Fabco Tie Pads
Sealed or Unsealed According to Conditions

FABREEKA PRODUCTS COMPANY
INCORPORATED
222M Summer Street, Boston 10, Massachusetts

NEW YORK 17, 122 E. 42nd Street
CHICAGO 10, 325 W. Huron Street
DETROIT 2, 6432 Cass Avenue
SPARTANBURG, S. C., P. O. Box 1168
PHILADELPHIA 2, 16 South Broad Street
PITTSBURG 22, 336 4th Avenue
OAKLAND 11, CALIF., 3871 Piedmont Avenue

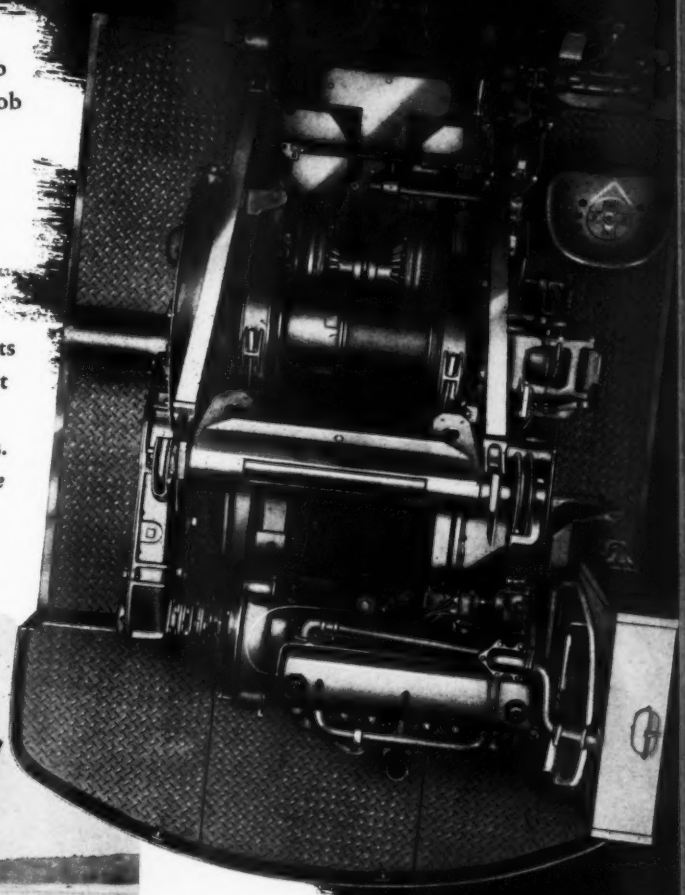
SIMPLICITY of DESIGN

DOES mean lower cost

HAVE you considered the problem of equipment upkeep in relation to your cranes? Look at the deck of a Northwest. It is clean. Only two main shafts. Few gears. Few adjustments. It is easy to care for. It means less "down time". Conversion, too, from Crane to Dragline, Shovel or Pullshovel is easier. It means less time wasted in changing basic machines to the right one for the job and it means less likelihood of the crew trying to do a job with the wrong equipment.

When you add to this basic advantage all the other Northwest advantages — the Cushion Clutch, the Uniform Pressure Swing Clutches, the Northwest Dual Independent Crowd, Ball and Roller Bearings on all High-Speed Shafts, along with many other cost cutting features, it is no wonder that so many Northwests are serving America's great railroads — And, don't forget the "Feather-Touch" Clutch Control. It means easy operation with greater safety and without complications. Your Northwest *can't be shut down out on the line because of control failure.*

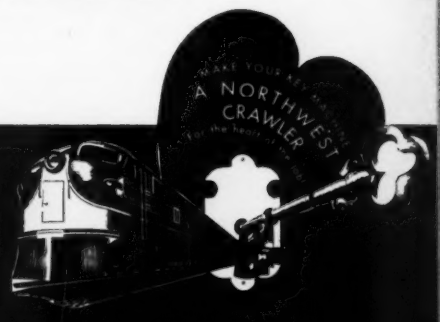
NORTHWEST ENGINEERING CO.
1513 Field Building
135 South LaSalle Street, Chicago 3, Illinois



Widening right-of-way on the Chicago, Milwaukee, St. Paul & Pacific Railroad

NORTHWEST

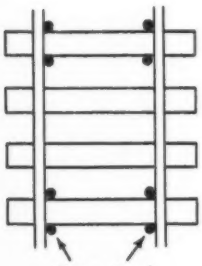
THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL



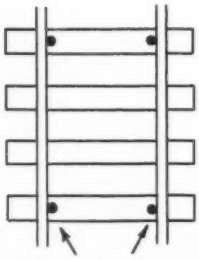
The Time to SAVE MONEY *on Your Track is when it is being* CONSTRUCTED!

In a Mile of Track there are:

- 133 Rail Lengths
- 3,192 Ties
- 6,384 Tie Plates
- 25,536 Track Spikes
- 4,256 Conventional Anchors



Conventional Anchors



Our 1-piece 2-way Compression Anchor

Eliminate Maintenance . . Minimize material costs as outlined below . . .Yet double the lateral strength of your track.

By eliminating 4,256 spikes we save	$ 298.00
By eliminating driving cost of 4,256 spikes, we make a labor saving of	170.24
Saved per mile	468.24
Using Conventional Anchors to accomplish TWO WAY ANCHORAGE requires 4,256 anchors at a cost of	1,276.80
Using the NO-CREEP RAIL ANCHOR to accomplish TWO WAY ANCHORAGE requires 2,128 anchors at a cost of	638.40
In each case above, 8 ties are anchored TWO WAYS. Saved	638.40
Savings in materials and labor per mile of track: Saved on Anchors	638.40
Saved on Spiking	468.24
Saved per mile of track	1,106.64

THE GREATEST SAVING PER MILE OF TRACK IS IN MAINTENANCE

It costs about $0.04 each to knock off, reset and redrive an Anchor. There are 4,256 anchors in a mile of track.

Cost per mile of setting anchors 4,256 x $.04	$ 170.24
Most railroads program this operation twice a year—for summer and winter; so 2 x $170.24 gives cost per mile per year	340.48
Cost for 10 years, per mile	3,404.80
Cost for 100 miles, 10 years	340,480.00

All of this maintenance cost is ELIMINATED WITH THE NO-CREEP Rail Anchor

The combined savings in material, labor and maintenance, over a ten year period are impressive.

Amount of maintenance eliminated	$340,480.00
Amount of materials and labor eliminated	110,664.00
Total Savings—10 years, 100 miles	$451,144.00

The

NO-CREEP

Rail Anchor

is the only fully self-compensating Anchor on the market: it compensates for all weather, TEMPERATURE and Traffic conditions, Continuously. It is self-adjusting; insert it and FORGET IT. Ask the Road Master.

Write for details.

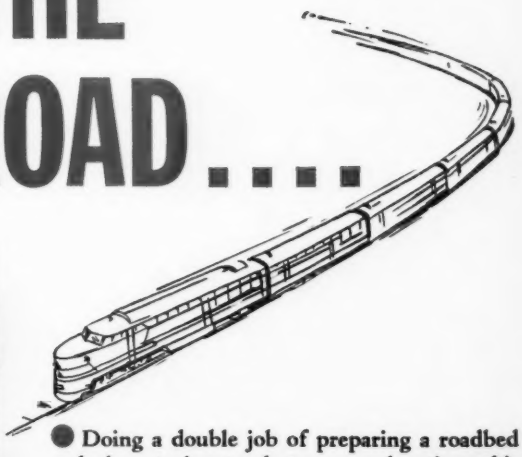
Phone BALTIMORE 1700

G & H RAIL CONTROLS, INC.

1704-6 Baltimore Ave. Kansas City 8, Mo.

Eastern Representative: Thomas J. Crowley Inc., 230 Park Ave., New York 17, N. Y.
Southwestern Representative: Alfred Engineering and Equipment Co., 515 Cotton Exchange Bldg., Dallas 8, Texas
Western Office: Roy H. Weber Co., 68 Post St., San Francisco 4, California

INTERNATIONAL POWER WORKS FOR THE MILWAUKEE ROAD....

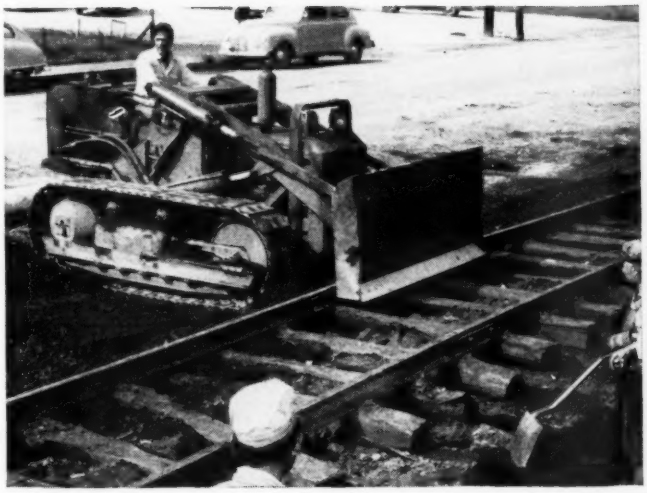


● Doing a double job of preparing a roadbed and also moving track to a new location, this International TD-9 equipped with a bulldozer shovel made fast work of a switch track relocation for the Milwaukee Road at Bensenville, Ill. Once again, International Crawlers proved their versatility on railroad construction and maintenance work.

International TD-9 moves dirt to prepare the new site for the track.

Owners and operators alike have learned that International Crawlers pay off in work done on the many and varied tasks of railroad maintenance and improvement. James Logalbo, operator of this TD-9, says, "I've never seen a tractor operate so easy for its size. I handle railroad 'frogs' weighing 2500 to 2600 lbs. with no trouble and I have pulled and pushed a string of four coal cars into position on a side track. For my money, this tractor has paid for itself long ago."

Your International Industrial Power Distributor is the man to see about crawler tractor power for railroad work. He will help you select the right size International from a full line ranging up to the TD-24 with 148.4 drawbar horsepower. Get on the right track now with International off-the-track power. You'll find it pays big dividends in work done.



Moving the track to a new location is a simple matter with the agile TD-9 on hand to do the pulling and pushing.

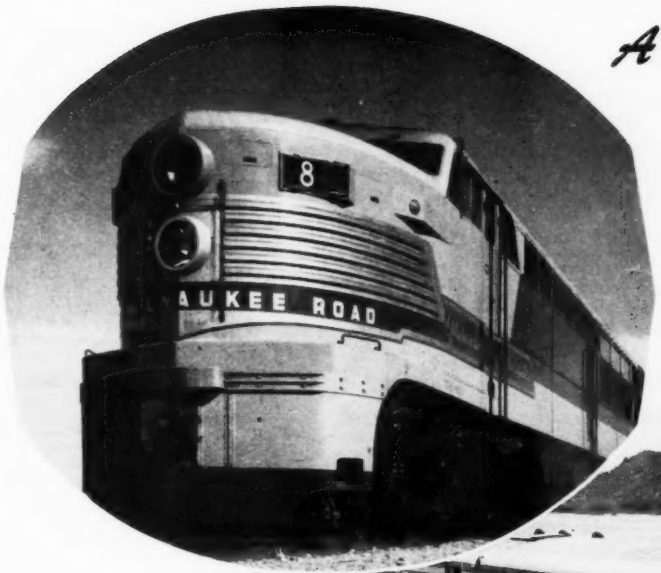
INTERNATIONAL HARVESTER COMPANY • Chicago 1, Illinois

CRAWLER TRACTORS
WHEEL TRACTORS
DIESEL ENGINES
POWER UNITS

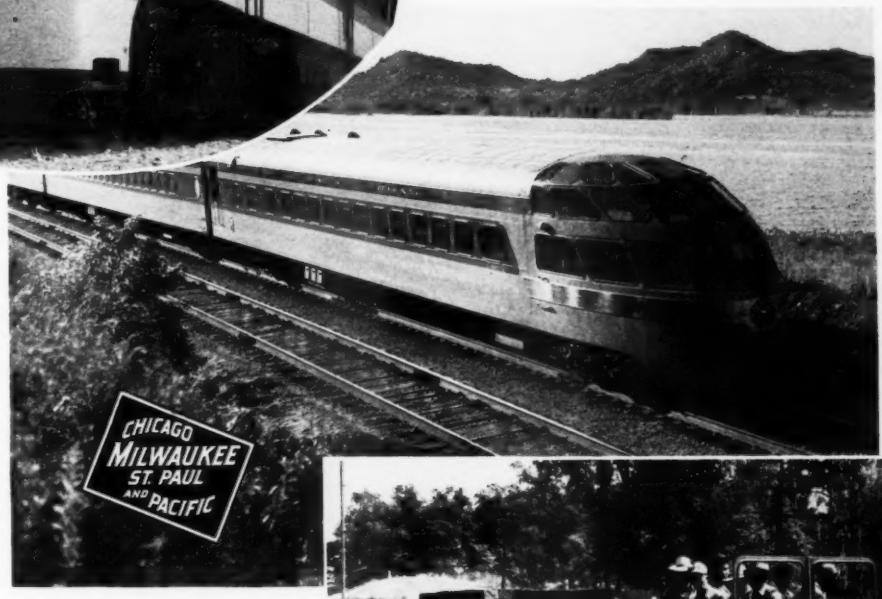
INTERNATIONAL HARVESTER

INTERNATIONAL INDUSTRIAL POWER

A Century of Leadership



A hundred years of railroading add up to a proud record of transportation service for the Milwaukee Road. With its Hiawatha Speedliners covering nine thousand miles a day, maintenance of dependable highspeed track over their 12-state route is essential. For many years WOOLERY Maintenance Machines have contributed to the efficiency and economy of this work, and the WOOLERY MACHINE COMPANY takes pleasure in saluting its distinguished railroad customer on this centennial occasion.

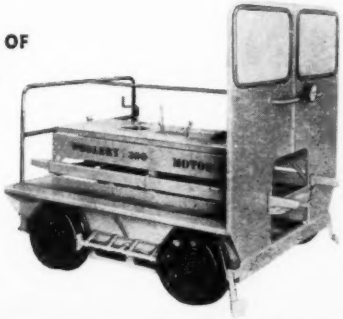


Above: The Olympian Hiawatha's 22-hundred-mile runs between Chicago and the Pacific Northwest are powered by 4000-h.p. Diesel locomotives.

At right: Glass-roofed Sky-Top Lounge cars give Hiawatha passengers added enjoyment of the scenery.

EIGHT MEN AND 84 HARDWOOD CREOSOTED TIES are hauled by a WOOLERY No. 300 Motor Car on its way to a tie-replacement job on the Milwaukee right-of-way near St. Paul, Minnesota.

PIONEER MANUFACTURERS OF RAILWAY MAINTENANCE EQUIPMENT SINCE 1917



WOOLERY No. 300 Motor Car gives added advantages of a light car with heavy-duty performance and greater pulling power. Four-wheel drive, with differential when needed; two speeds forward, two reverse. Light enough for one man to lift on or off at crossings; large enough to carry eight men and track tools.

WOOLERY MACHINE COMPANY
MINNEAPOLIS MINNESOTA
Pioneer Manufacturers of **RAILWAY MAINTENANCE EQUIPMENT**
RAILWAY WEED BURNERS • MOTOR CARS • FLANGEWAY CLEANERS • TIE CUTTERS • TIE PLATE SPACERS • RAIL JOINT OILERS • CREOSOTE SPRAYERS
EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., NEW YORK, N. Y.

RAILROADERS'

"MAGIC CARPET" whisks 100 tons of coal aboard every minute!

NEW G-E EQUIPPED PIER HANDLES COAL FASTER, GENTLER!

1. A "magic carpet" of rubber 2 miles long, which gently whisks 6,000 tons of coal an hour from hopper cars to waiting ships, is the eye-opening feature of the new $8,000,000 Chesapeake and Ohio Pier 14 at Newport News, Va. Four mobile towers move to any hatch opening, so that further movement of ships, once they are berthed, is unnecessary. And for dependable power, Pier 14 relies completely on General Electric equipment, all the way from conveyor drives to yard lighting. Here's another example of broad scale G-E electrification at work.

2. The loaded coal hopper cars are fed by gravity from an 800-car storage yard, roll past the scale house where they are weighed while in motion, and coast down 2 "barney" hauls (above). A "barney" or "mule" pushes them up the incline to the car dumpers.

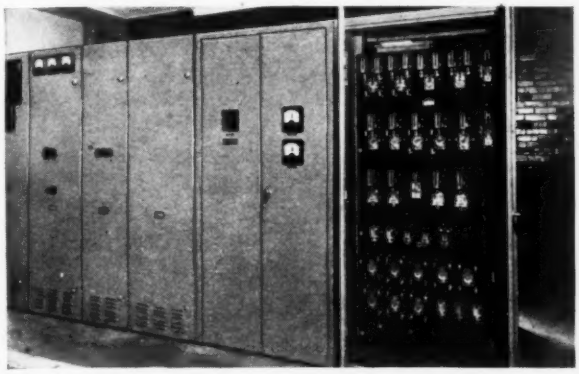
3. Each "barney"—a cable operated pushing unit—is powered by a G-E 4-unit motor-generator set (above) which in turn drives two 250-hp G-E motors. These motors are geared to the cable drum which is used to pull one or two loaded hoppers at a time up the incline.

GENERAL ELECTRIC

152-9

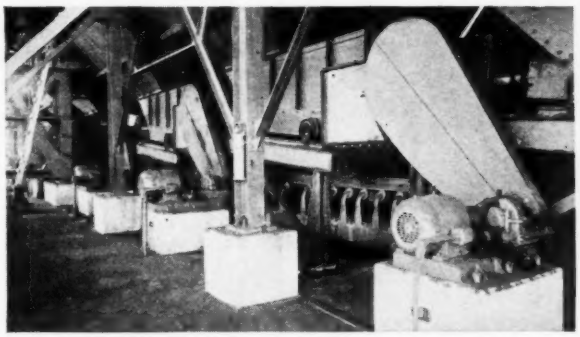
DIGEST

News and notes about
GENERAL ELECTRIC products
for the railroad industry



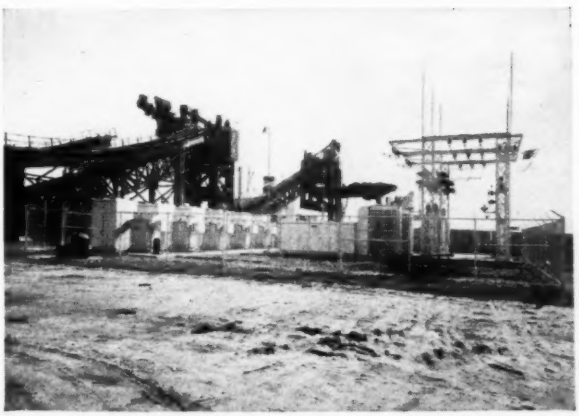
4. G-E control equipment is used throughout the C&O's new pier. As illustrated by this metal clad control (above), these units are completely metal enclosed to protect personnel. They come in compact, assembled "packages"—all ready for installation.

5. The cars are spotted on dumpers (above) which empty coal into the hoppers below. Equipped with 2 G-E 40-hp ac motors, G-E controls and limit switches, each of these rotary dumpers upturn a 70-ton car, empty it, right it again—all in 60 seconds.



6. The coal in the dumper hoppers is fed onto collecting belts, each of which is driven by a 50-hp totally enclosed, fan-cooled G-E Tri-Clad motor (above). These motors provide 3-way protection against physical damage, electrical breakdown, and operating wear and tear.

7. On each of 4 main conveyors, the coal is carried to a tower and loading boom where it is lowered into the hold of a ship. The drive for each main conveyor belt (above) is a 125-hp G-E Tri-Clad motor plus a 30-hp G-E Tri-Clad motor to reduce slack tension on the belts.

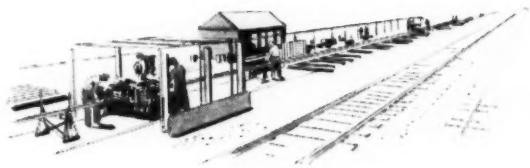


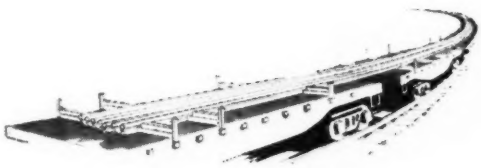
8. From this 22 KV G-E "package" substation (left) current is distributed to 6 G-E outdoor load-center unit-substations, and from there to various G-E Cabinetrol motor control units. Selective switching in the substation permits energizing one-half of the pier at a time or feeding both halves from one transformer bank in case of emergency.

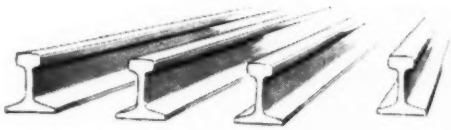
Power is critical at Pier 14!

Excessive outages can't be tolerated. That's one reason why reliable G-E equipment was specified "down the line." Your road may never build a coal pier—but it will always be interested in getting electrical equipment it can count on, whether it be for keeping switches snow free or for running a diesel testing set. Why not take advantage of G-E experience in railroad electrification? Your nearest office will be glad to help. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

NOW is the time to plan your 1951 Rail Welding Program







When you are planning continuous rail—RIBBONRAIL—for open track. tunnels, bridges, or stations, call in OXWELD.

—Talk the whole plan over with us. We will arrange the scheduling of an OXWELD pressure unit and show you the most economical methods based on our experience of over 11 years in this operation.

—We'll help you pick a welding location for the OXWELD six station pressure welding set-up.

—We'll plan your transportation method for long lengths with equipment you now have . . . flat cars, skid rails, or push cars and buggies.

—Just specify in your next rail order that rail ends must be undrilled, unbeveled, and unhardened.

—We repeat, now is the time to plan your 1951 rail welding program. Include RIBBONRAIL in your 1951 budget.

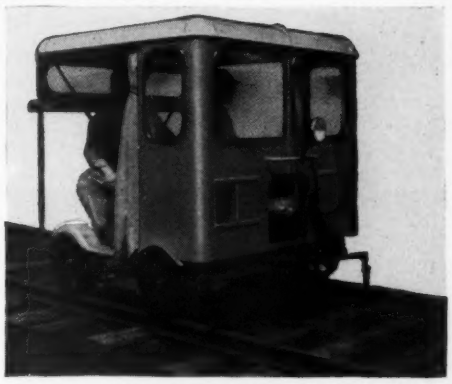
The terms "Oxweld," and "Ribbonrail" are trade-marks of Union Carbide and Carbon Corporation or its Units.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York
In Canada:
Canadian Railroad Service Company, Limited, Toronto

OXWELD RAILROAD SERVICE

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

Let ALUMINUM lighten the job!



It's good business to save trouble for your "trouble-shooters". Aluminum equipment can help you do it.

Take these up-to-the-minute inspection cars—built by Fairmont Railway Motors, Inc., Fairmont, Minn. They make extensive use of Alcoa Aluminum Sheet, Extrusions and Castings. Because aluminum is light in weight, cars handle easily. Thick sections add strength, durability. Upkeep is low, because aluminum *lasts,* resists corrosion.

Let *aluminum* lighten the job! Before you buy, ask your supplier about maintenance tools and equipment made of Alcoa Aluminum. You'll speed the work, save effort, cut costs. ALUMINUM COMPANY OF AMERICA, 1820 L Gulf Building, Pittsburgh 19, Pa. Sales offices in principal cities.

ALCOA FIRST IN ALUMINUM ...THE METAL THAT *LASTS*

ALCOA ALUMINUM

The New '50 TRUE TEMPER RAIL ANCHOR

EFFICIENT—Easy to apply—easy to remove

ECONOMICAL—Cannot be overdriven—especially adapted to worn and corroded rail bases

EXCLUSIVE—Made and sold only by:

TRUE TEMPER Corporation
Railway Appliance Division

GENERAL OFFICES • CLEVELAND, OHIO
Factory: North Girard, Pa.
District Offices:
2033 Daily News Building • Chicago, Illinois
105 Duane Street • New York, N. Y.
Representatives at: St. Louis, Missouri • St Paul, Minnesota

TRUE TEMPER

ALSO MAKERS OF TRUE TEMPER RAIL FORKS • RAIL JOINT SHIMS • BALLAST FORKS • TRACK SHOVELS • SCOOPS • SCUFFLE HOES • AXES • HAMMERS • HATCHETS • SCYTHES • WEED CUTTERS

ADDITIONAL INFORMATION

On Any of the Products Mentioned in This Issue

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

Products Index

RAILWAY ENGINEERING AND MAINTENANCE

November, 1950

Please send me additional products information as requested below.

☐ Literature Only ☐ Desire to see Representative ☐ Price Data

Product and Page No. .....

" " " .....

" " " .....

" " " .....

Name .....

Title or Position .....

Company .....

Address..... City..... Zone..... State.....

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RAILWAY ENGINEERING & MAINTENANCE

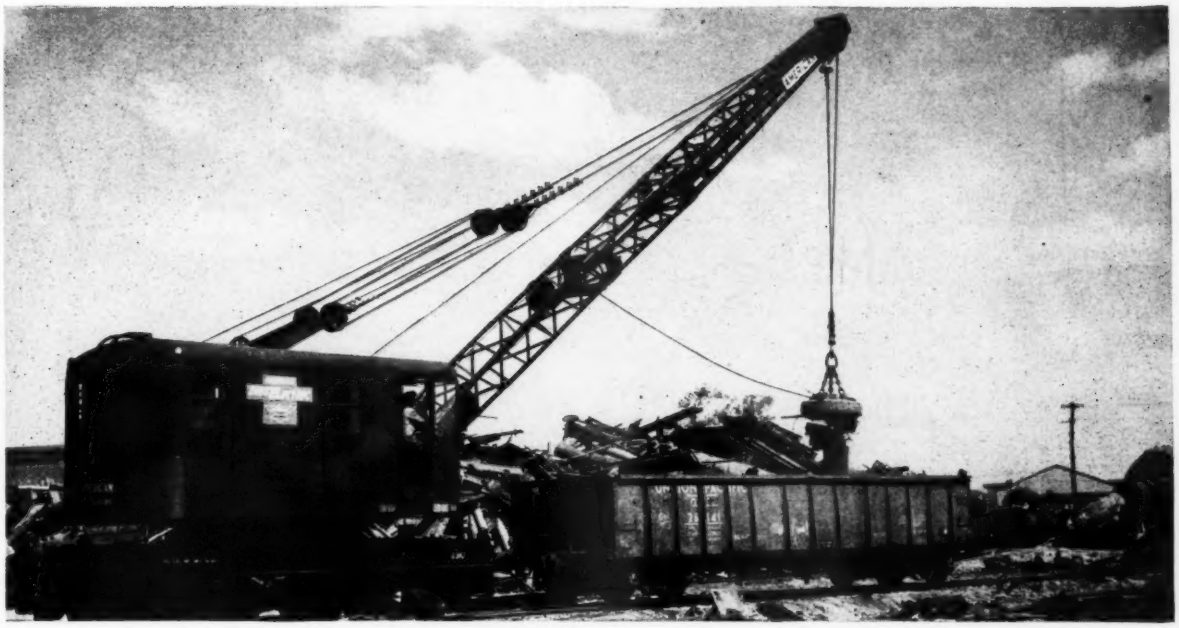
30 Church Street

New York 7, New York

READER

What's your job?

- ☐ Tie handling
- ☐ Pile driving
- ☐ Track re-locating
- ☐ Bridge building
- ☐ Ballast handling
- ☐ Emergency fueling
- ☐ Rail setting
- ☐ Materials handling
- ☐ Pole setting
- ☐ Stockpiling
- ☐ Scrap handling
- ☐ Yard service
- ☐ Car shop work
- ☐ Switching operations
- ☐ Cinder loading
- ☐ Heavy lifting
- ☐ Wrecking service
- ☐ Locomotive coaling
- ☐ Right-of-way maintenance
- ☐ Construction jobs
- ☐ Freight transfer



An American DiesELectric does them all...and more!

● You might, of course, do all of the jobs listed above with an old style steam crane. Or, for that matter, on some of them you could probably use mule teams. But would you make any money for your railroad?

Today's biggest news, in the field of railroad work-power, is the American DiesELectric Locomotive Crane. It does *all* the big, tough, heavy jobs at top speed and rock bottom cost. It *makes money* on every one of these operations.

With a DiesELectric on the tracks, you start work in the morning just by pushing a button. You work with magnet, bucket, hook or other tackle. You can push the crane at top speed for hundreds of hours, if you need to. You have diesel power to the deck, electric power to the wheels—the greatest power-speed-smoothness combination ever developed. One man runs this crane. And when he shuts it down at night, all costs are instantly stopped.

Available in a wide range of sizes and capacities. Mail the coupon for fully descriptive catalogs.

American Hoist
& DERRICK COMPANY
St. Paul 1, Minnesota

Plant No. 2: SO. KEARNY, N.J.
Sales Offices: NEW YORK • PITTSBURGH • CHICAGO

American Hoist & Derrick Company 31 5614
St. Paul 1, Minnesota

● Please send catalog on _____ ton American DiesELectric Locomotive Cranes.

Name _____
Company _____
Address _____
City _____ *State* _____

Look at the "

OF THE PULLMAN-S

Circled in this crib's-eye view are the "picks" and (behind them) the "digger bars" that bite into the hardest cemented rock ballast, crack it like peanut brittle, and sweep it out with whisk-broom ease.

They are made of heat-treated chrome-nickel steel. A 7200-pound drophead pile-drives them into the ballast with 201,600 inch pounds of energy thirty times a minute. And cribs come clean in *seconds!*

That's putting *power* to work the modern way for fully mechanized track maintenance that saves manpower, time, and money. *Important* money, as case history after case history proves.

The Pullman-Standard Power Track Cribber *pays for itself* out of savings. So do the Pullman-Standard Ballast Cleaner and Power Track Ballaster. The three machines can be operated *as a production-line team,* to give track the "full treatment" if desired.

Investigate these sturdy, capable machines...and the *three ways* in which they may be acquired, for immediate money-saving action. Full information will be promptly supplied.

AGAIN . . . LOOK AT THE "BUSINESS END"

This one case history, *out of many,* shows how the Pullman-Standard Power Track Cribber is saving important money for important railroads. In this instance, it cribbed out 8014 cribs in very hard cemented rock ballast at an average speed of *45 seconds* per crib. Hand-work required approximately one man-hour per crib. Comparative costs *per crib* were:

Hand-Cribbing	$1.00*
Machine-Cribbing	0.20
Saving per Crib	0.80
Saving for 8014 Cribs	$6,411.20

**Cost calculated before latest wage increases and 40-hour week.*

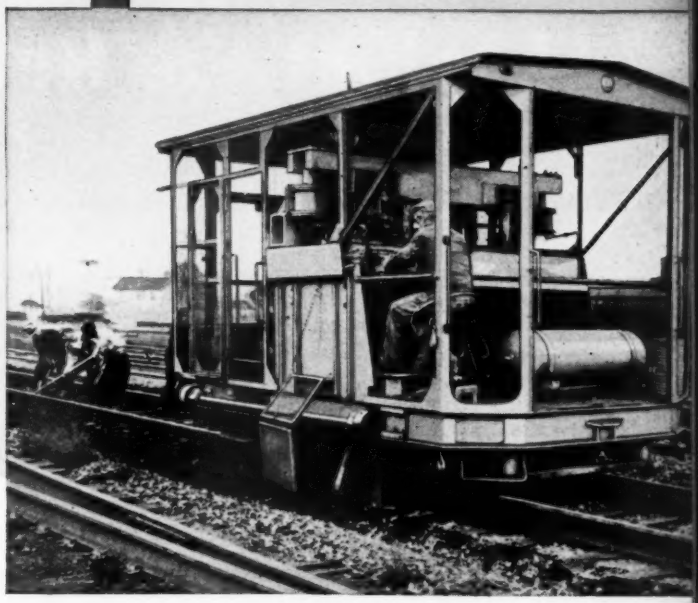
"TRACK AT ITS LEVEL BEST" describes, illustrates, and diagrams all three Pullman-Standard track maintenance machines. 24-pages, data-file size. Write for your copy.

THREE WAYS TO BUY

Pullman-Standard power track maintenance machines are available to railroads in any of these ways:

1. **By outright purchase.**
2. **By deferred payment.**
3. **By rental, with option to purchase.**

The Pullman-Standard Power Track Cribber can crib out from 170 to 250 feet of track per hour. Interchangeable 4-, 5-, and 6-inch digger-bar tips are available for working varying ballast conditions with greatest efficiency. The cribber travels to and from location under its own power, at a speed of 25 miles per hour. Power-operated jacks and transverse wheels permit complete setoff in from 3 to 5 minutes.



e "Business End"

N- STANDARD POWER TRACK CRIBBE

Pullman-Standard
CAR MANUFACTURING COMPANY
POWER BALLASTER DIVISION
79 East Adams Street, Chicago 3, Illinois

BIRMINGHAM 3, 1004 First National Building
CLEVELAND 15, 907 Midland Building
NEW YORK 17, 52 Vanderbilt Avenue
PITTSBURGH 19, 1115 Gulf Building
WASHINGTON 6, D. C., 1025 Connecticut Ave., N.W.
SAN FRANCISCO 4, 2910 Russ Building

CANADA: The Holden Co., Ltd.
Montreal 3, 614 St. James St. W.;
Toronto, 128 Simcoe St.; Winnipeg, 150 Princess St.;

Look at Safety...

Look at Efficiency...

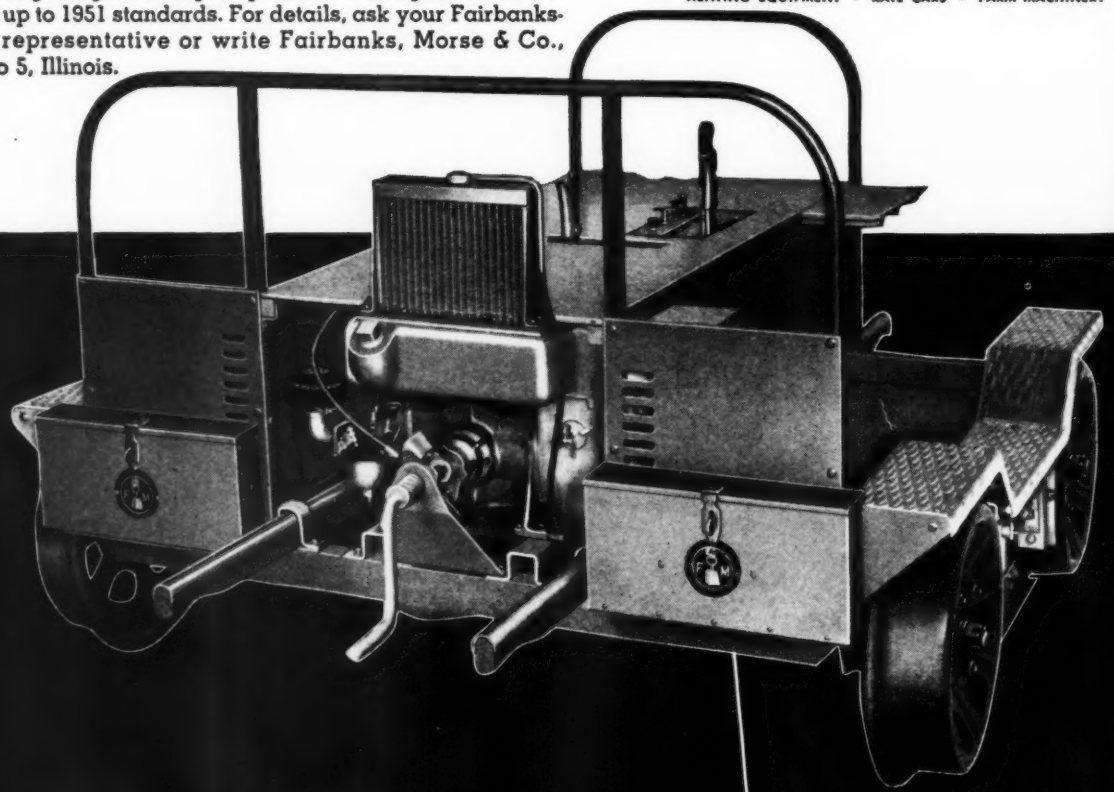
Look at the New Model 101

Yes, this inspection car is something to inspect. It offers new standards of safety, new features for on-the-job efficiency. Simple friction wheel transmission provides four speeds forward, three reverse — and, for maximum protection of the crew, an immediate reverse without reversing the engine. Wheel silencers, too, add to safety — allow the crew to hear approaching trains or automobiles. Built to carry four men in comfort, the 101 has a one-man rear lifting weight of only 98 pounds. Throughout, it is designed up to 1951 standards. For details, ask your Fairbanks-Morse representative or write Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE,

a name worth remembering

DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE AND HEATING EQUIPMENT • RAIL CARS • FARM MACHINERY



YOUR **EXTRA EMPLOYEE** THAT WORKS WITHOUT PAY

RACINE *Unit* TIE TAMPER

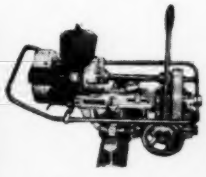
If you had an extra man working eight hours per day, you'd notice the increase in tamped track. A Racine Unit Tie Tamper provides that increase — GIVING YOU THE EQUIVALENT OF EIGHT HOURS MORE WORK EVERY DAY.

Racine Unit Tie Tampers speed up your work and increase manpower efficiency by reducing fatigue. Easily carried, easily operated, shock-free — they team up productively with your operators.

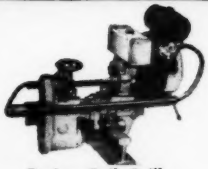
You get longer tool life with less machine maintenance, more uniformly compacted ballast that remains properly placed longer. All these are extras that make the Racine Unit Tie Tamper a valuable employee to serve you capably for a long, long time. Write for free 3-color catalog.

- LIGHT IN WEIGHT (60 lbs.)
- SHOCK-FREE OPERATION
- 1500 BLOWS PER MINUTE
- EASY STARTING MAGNETO IGNITION
- BALANCED RECOIL—SMOOTH ACTION
- LOW MAINTENANCE COST
- 80% IMPROVEMENT IN TOOL LIFE
- LONG TROUBLE-FREE LIFE

OTHER PORTABLE MACHINES BY RACINE



Racine Bond Drill



Racine Rail Drill

Racine Rail Cutter

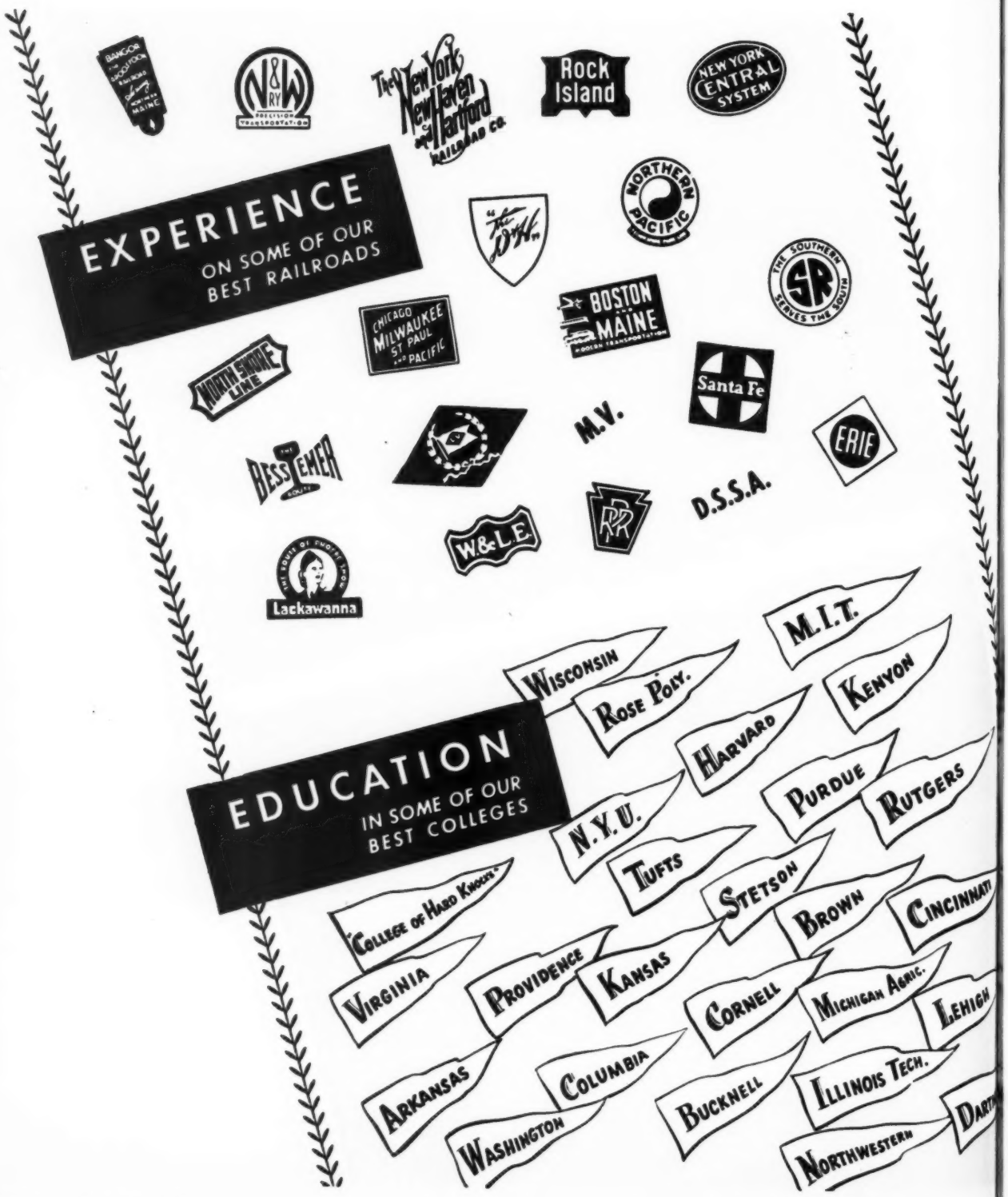
RACINE

TOOL AND MACHINE COMPANY

1738 State Street, Racine, Wis.

RAILWAY AGE

HAVE



Only 27 lbs.

But Look at the Performance You Get

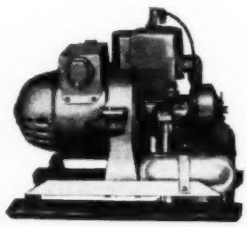
When very accurate cuts are necessary a helper's handle is easily attached to insure precise cuts at any angle.

Small, compact and easily handled, the Homelite Chain Saw gets in and cuts where larger saws are unworkable.

Here, for the first time, is a small saw that does the work of a big saw . . . a modern, high cycle electric chain saw that can be handled by one man with complete ease. Extremely fast and efficient, this saw cuts heavy timber and trees up to 36" diameter in amazingly low time. And because of its light weight . . . only 27 lbs. complete . . . it is easily operated no matter where your cutting is necessary.

Another important point, with a Homelite Chain Saw you get *electric* chain saw efficiency everywhere . . . even in remote locations . . . for you operate your Homelite Chain Saw with a Homelite Dual Purpose Generator, a *carryable* generator that can be picked up and easily transported to any job at any location.

Your Power Unit For a Plus Performance



A Homelite Dual Purpose Generator is really a *multi-purpose* generator. You can use it not only for your Homelite Chain Saw but for operating both high cycle and standard universal 110 volt tools plus floodlights on emergency night work.

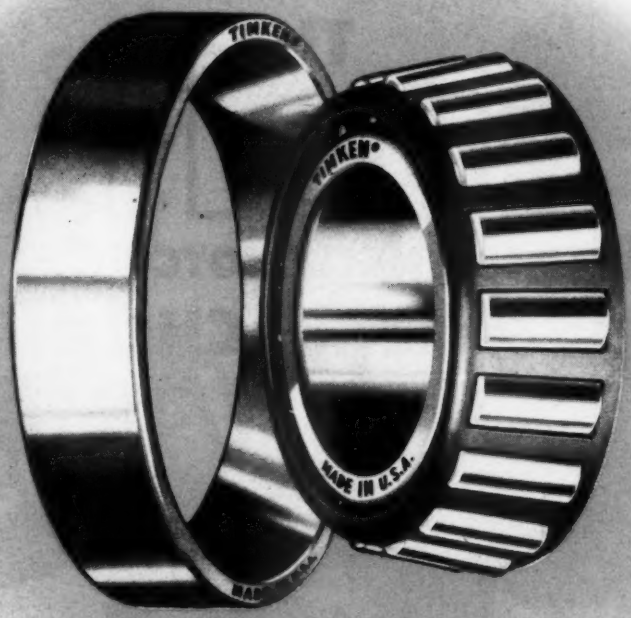
See how this is done. Write, today, for our new Homelite Chain Saw bulletin.

HOMELITE

CORPORATION

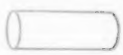
211 RIVERDALE AVENUE, PORT CHESTER, NEW YORK

MANUFACTURERS OF HOMELITE CARRYABLE PUMPS • GENERATORS • BLOWERS • CHAIN SAWS



NOT JUST A BALL

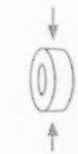
NOT JUST A ROLLER



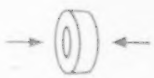
TIMKEN TAPERED ROLLER

TRADE-MARK REG. U. S. PAT. OFF.

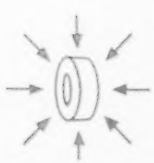
BEARINGS TAKE RADIAL



AND THRUST LOADS



OR ANY COMBINATION



THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO

What's the best way...

to cut rail cropping costs

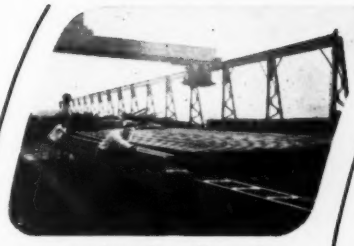
by portable field units?
...or fixed installation?

Both are excellent!... but, many roads find that a centrally located rail cropping plant usually lends itself to a more efficient and economical operation.

With a fixed installation, the work can be set up on a continuous production basis... rails can be collected at a central point, and the road can realize the full capabilities of specialized workmen.

As shown in the accompanying photographs, rail cropping is simple, easy and quick. The Airco developed rail cropping machine employs two highly efficient, oxyacetylene flame cutting tips, which cut rails of any size, making as many as 25 cuts an hour, and producing a surface that requires a minimum of grinding.

For further information, write your nearest Airco office.

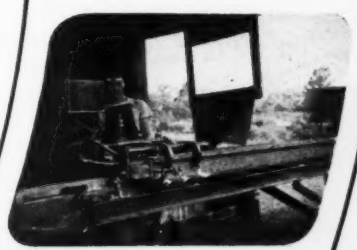


...conveying the rail to the cropping machine.

...making the bottom, or backward, cut. (Note: This machine is portable and can be transported to the right-of-way, if so desired.)

...cropped rail, showing cut quality.

...finishing the cut end.



...drilling bolt holes in rail end.

COSTS COME DOWN UNDER THE AIRCO PLAN

AIRCO **AIR REDUCTION**

Offices in Principal Cities

Headquarters for Oxygen, Acetylene and Other Gases... Carbide... Gas Welding and Cutting Machines, Apparatus and Supplies... Arc Welders, Electrodes and Accessories.

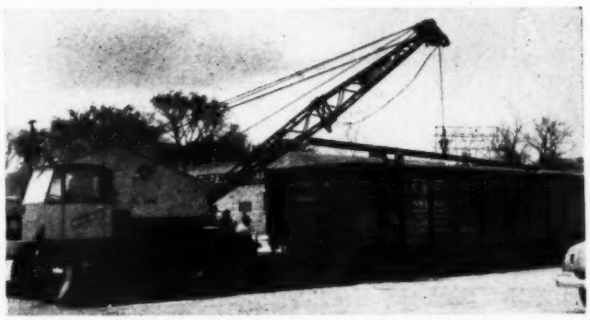
4 RAILROADS PROBLEMS SAVINGS WITH LORAINS

To lift . . . or dig . . . or load . . . or build . . . there's a money-saving, cost-cutting Lorain to do the job. Here are four examples of Lorains working on the railroad. Each job is a different one — and each job called for a different *type* of Lorain for best results. There's no limit to the applications for Lorains on your road . . . whether it be yard duty, right-of-way maintenance, new construction . . . any of these duties can be handled by one of 160 Lorain combinations in the complete line. Lorains are available in several capacities . . . for mounting on crawler or rubber-tires . . . with 5 interchangeable front ends. Your Thew-Lorain Distributor has a real story about Lorains for railroad duty that you can't afford to miss! See him soon — or send for new booklet "LORAINS ON THE RAILROADS."

MORE FOR YOUR MONEY IN A LORAIN

THE THEW SHOVEL CO.
LORAIN, OHIO

BIG LORAINS FOR CONSTRUCTION A big 2-yard Lorain-820 shovel loads ballast from bank cut into gondolas for the Frisco road.



MOBILE LORAINS FOR YARD DUTY A 30 m.p.h. mobile Lorain Moto-Crane on rubber tires covers a lot of ground per day for a midwestern railroad.

MAINTENANCE OFF THE RIGHT-OF-WAY Off-track maintenance called for off-the-car service and was solved by this Lorain TL dragline, cleaning ditches for a central Illinois railroad.

MAINTENANCE ON THE RIGHT-OF-WAY Working from atop the flat car, this Lorain-41 clamshell moved along the track on maintenance work — reaching far to either side of the right-of-way.

THEW LORAIN®

SHOVELS • CRANES • HOES
DRAGLINES • CLAMSHELLS
ON CRAWLERS OR RUBBER TIRES

COMPRESSION

Rail Anchors

With bridge engineers, protection against running rail in both directions is vital. That's why you find Compression two-way holding a standard feature on many of the nation's foremost spans.

THE RAILS COMPANY

General Office

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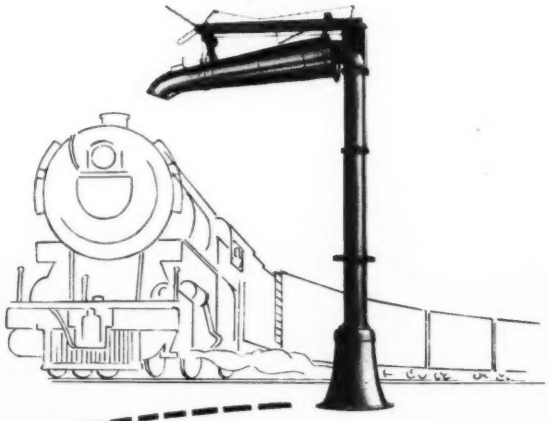
Prevent Costly Hammer or Shock!

by using GA GOLDEN-ANDERSON

STANDPIPE WATER COLUMNS

WITH

"Cushioned" VALVES



Golden-Anderson counter-balanced Railroad Standpipe Columns and Cushioned Valves have been used for over fifty years by America's leading railroads for absolute dependability, longer service and less maintenance.

The water column rotates in a 360° circle permitting use between tracks. The free joint on the spout and the automatic drain valve make this water column freeze-proof.

The valve is easily adjusted for any required speed of operation on high or low pressures. The air and water cushioning enables the valve to function smoothly without hammer or shock.

Write for Engineering Bulletin

GOLDEN-ANDERSON
***Valve* SPECIALTY COMPANY**
2078 KEENAN BUILDING · PITTSBURGH 22, PA.

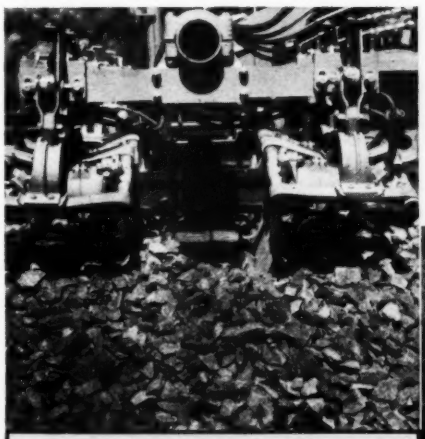
LIFE AND PROPERTY PROTECTION
VALVES
FOR OVER 50 YEARS

LEHIGH VALLEY R. R. CO.

41st IN THE SWING TO JACKSON MULTIPLE TAMPERS

What's the best means of putting up the finest quality track in the shortest possible time with the least amount of labor and the minimum of expense?

Nearly 50 leading railroads and contractors have backed their answers to this question with purchases of JACKSON Multiple Tampers. Many are repeat purchasers, now operating from 6 to 29 of these machines.



IN OPERATION ON THE LEHIGH. NOTE CHARACTER OF THE BALLAST BEING USED.

In view of this preponderant swing to the JACKSON Multiple wouldn't it be well, before purchasing any major ballasting equipment, to discuss with one of our thoroughly practical field engineers just what this machine would do for you? We would be happy to route him your way, send you literature or give you the nearest location where you can observe a JACKSON Multiple Tamper in action. Drop us a line.

ELECTRIC TAMPER & EQUIPMENT CO.

LUDINGTON, MICH.

You can handle MORE jobs on a LOWER equipment

with the ALLIS-CHALMERS HD-5G TRACTOR

and interchangeable Tracto-Shovel attachments

This one versatile outfit cuts cost on all kinds of construction, maintenance and material handling—builds up shoulders—carries and places ties, rails and ballast — removes brush and cleans ditches — stores and compacts coal. These and dozens of other jobs are handled on a single, low investment for tractor and one or more specially designed attachments. Investigate further how the HD-5G and Tracto-Shovel will save money for you. Write for literature or see your Allis-Chalmers dealer.

THE MOST ADVANCED TRACTOR IN ITS POWER CLASS...

BIG WORK CAPACITY — This completely new smaller tractor has big tractor design, balance and stamina . . . surprises users everywhere with its performance. As owners say, "You've got to see it to believe it."

JUST THE RIGHT SIZE — to efficiently handle a wide variety of jobs. Has 11,250 lb. of properly balanced weight (tractor bare) . . . 40.26 drawbar hp. provided by the smooth-running, economical, 2-cycle GM Diesel engine — every down stroke a power stroke!

NEEDS LESS GREASING THAN AN AUTOMOBILE — Instead of hitting a dozen or more grease fittings every shift, you lubricate only one fitting every two weeks, two other fittings every five weeks (based on 40-hour weeks). *And you operate a full 1,000 hours* before replenishing lubricant in truck wheels, track idlers and support rollers.

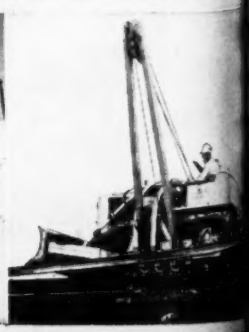
SIMPLE TO SERVICE — All adjustments are unusually accessible. Major assemblies are removable without disturbing unrelated parts — engine, clutches, transmission, etc. There's less downtime — more time working . . . labor and repair costs are reduced.

BUILT-IN SAFETY AND CONVENIENCE — Easier steering and shifting with convenient controls, full vision. Cushioned seat, wide arm rests. Operator gets more done because it's easier to do more!

USEFUL TIP FOR BUILDING UP SHOULDERS

—Hydraulically controlled bucket tips forward . . . places dirt right where it is needed. HD-5G builds shoulders in two-thirds the time required by conventional 'dozers of equal size!

SOME OF THE MANY JOBS YOU CAN DO WITH THE HD-5 TRACTOR . . .




nvestment
14 TRACTO-SHOVEL ATTACHMENTS
that can be interchanged in but a few minutes
1 cu. yd. Standard Bucket
¾ cu. yd. Narrow Bucket
2 cu. yd. Light Materials Bucket
1 cu. yd. Rock Bucket
Teeth For All Buckets
Heavy-duty Bulldozer Blade
Heavy-duty Angledozer Blade
Lift Fork (4,000 lb. lifting capacity)
Crane Hook (5,000 lb. lifting capacity)
V-type Snowplow
Trench Hoe
Drag Bucket
Tine Fork
Rock Fork
The usefulness of the HD-5 Tractor is further widened by other Allied equipment: 2-wheel scrapers, dozers, rippers, rollers, cranes, winches and log carts.
ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U.S.A.
for Greater Production...for Easier Operation...for Simplified Servicing

No. 263 of a series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION
79 W. MONROE STREET
CHICAGO 3, ILL.

Subject: A Balanced Paper

November 1, 1950

Dear Readers:

Have you ever taken particular note of the contents of Maintenance by categories of subject matter? Perhaps you have not, at least consciously—perhaps you have simply read those articles and other material that you have found of particular interest, and have paid little attention to the matter that seems to be outside your range of interests.

It has occurred to me that you might be interested in an account of the reasoning on which is based the selection of subject matter for your magazine. The problem of the editors in this respect is complicated by the rather diversified interests of the subscribers. Many of our readers have responsibilities primarily relating to track and roadbed maintenance. Others are particularly concerned with the upkeep of bridges and buildings. Still others have water service matters as their primary field of interest. And then there is that rather large group of higher ranking officers who must keep their finger tips on developments in all these fields.

Obviously, the problem of the editors is to provide material that will satisfy the needs of all the catagories of readers. That is why you will find that the feature section of each regular issue contains articles on track maintenance, on subjects relating to bridges and buildings, and on water service. (In this issue, since so much space is devoted to coverage of the Bridge & Building convention, the feature articles nearly all deal with track subjects.) Also, in practically every issue you will find at least one article on some general subject, such as safety, that is of interest to the entire readership.

Carrying this line of reasoning a step further, isn't it logical that the amount of material in each category should be roughly in proportion to the number of readers interested in it? For example, since track-maintenance men comprise by far the largest single group of readers of this magazine, our objective is to provide a larger proportion of track-maintenance articles in each issue than any other classification of material. In the first six issues of 1950, for instance, articles on track subjects occupied 39 per cent of the space in the feature section. To complete the picture, 30 per cent of the articles in these issues dealt with bridge and building subjects, 6 per cent with water-service matters and 25 per cent with general or miscellaneous subjects of interest to all readers. Further, the questions in the What's the Answer department are proportioned on about the same basis.

Hence, you can see that every line of material in each of our issues, whether or not it is of direct interest to you, is there to serve a particular need. It might also be pointed out that, by presenting a diversification of material to serve each segment of our readership, we also satisfy the needs of those readers, whether higher-ranking officers or younger men on the way up, who wish to keep abreast of developments in all fields of railway maintenance.

Yours sincerely,

Merwin H. Dick

MHD:ag

Editor

MEMBERS: AUDIT BUREAU OF CIRCULATIONS AND ASSOCIATED BUSINESS PAPERS, INC.

Pittsburgh STATIONHIDE

MATCH the modern beauty of trim, sleek streamliners by bringing your stations up-to-date with Pittsburgh STATIONHIDE.

By using color arrangements that emphasize the best architectural features and subdue awkward angles and lines, these stations can be made to appear lower, neater and more attractive. Use of appropriate color combinations can also make interiors brighter, cheerier and more comfortable.

Pittsburgh offers STATIONHIDE in a variety of modern colors for inside and outside use. STATIONHIDE for exteriors is a scientifically prepared finish, custom-made for the job of beautifying and protecting railway stations. It brushes or sprays easily, dries to a tough, elastic coating which will not discolor or darken from coal smoke or industrial fumes and will stand up under severe climatic conditions.

Interior STATIONHIDE for walls and trim is an economical, durable finish in a variety of colors which will withstand the hardest kind of wear.

Call on us for expert advice. Our wide experience in the field of railway finishes often can save you time and money.

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PITTSBURGH PLATE GLASS COMPANY
Industrial Paint Division, Pittsburgh, Pa.
Factories: Milwaukee, Wis.; Newark, N. J.; Springdale, Pa.; Houston, Texas; Los Angeles, Calif.; Portland, Ore. Ditzler Color Division, Detroit, Mich. The Thresher Paint & Varnish Co., Dayton, Ohio. Forbes Finishes Division, Cleveland, Ohio.

Write for this FREE Booklet!
Contains Pittsburgh's complete line of Railway Structural Maintenance Finishes with many practical suggestions for their efficient and economical use.

PITTSBURGH PAINTS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

Fairmont

RAILWAY MOTOR CARS
AND WORK EQUIPMENT

versatility . . .

another Fairmont achievement!

The Fairmont Hy-Rail (A31 Series A) is an excellent example of Fairmont's effort to broaden the operational range of railway equipment. For, while this remarkably versatile motor car is designed primarily for rail use, it operates with equal facility on the highway should the need arise. Its pneumatic tires, in both cases, carry the load—while guide wheels simply position the car on the rails. Guide wheels are retracted by hydraulic control for highway operation. Four-wheel drive provides great flexibility of power and speed at all times. Hy-Rail is another great Fairmont achievement—built to the basic idea that *performance on the job counts!*

Performance
ON THE JOB
COUNTS

FAIRMONT RAILWAY MOTORS, INC., FAIRMONT, MINNESOTA

Published on the first day of each month by the

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PRINTED IN U.S.A.

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

VOL. 46, NO. 11 NOVEMBER, 1950

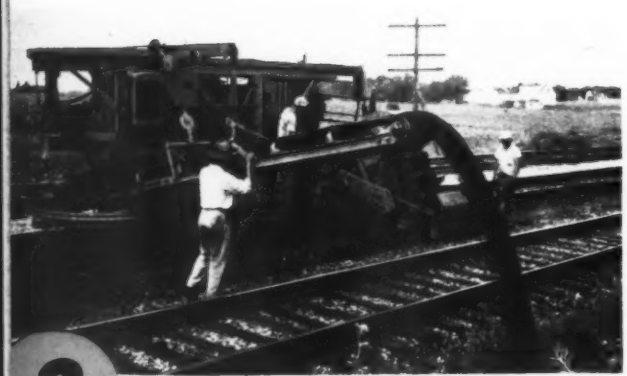
Two month demonstration

TEST PROVES OUTSTANDING PERFORMANCE of the NORDBERG ballast reconditioning "THREESOME"

1 CRIBEX...

This spring, a two month demonstration test of the Nordberg ballast reconditioning "threesome" was started on a midwestern Class A Road. 4 Cribex, 1 Ballastex and 1 Screenex were teamed together to clean *fouled slag ballast.* Despite very unfavorable weather conditions, 15.2 miles of single track was cleaned "out-of-face" (Cribs, Shoulder and Intertrack screened for total distance) in 43 available working days, including 2½ days lost due to weather. Here is a summary of work done from April 6 through May 29:

2 BALLASTEX...



3 SCREENEX...

FOUR CRIBEX	
Total half-Cribs excavated	78,151
Total full Cribs excavated	39,076
Total miles cribbed	12.21
Average half-Cribs excavated per Cribex per machine hour	108.4
Average track feet half-cribbed per machine day	3700
Average track feet fully cribbed per machine day	1850
BALLASTEX-SCREENEX	
Total feet cleaned, Shoulder Side	60,867
Total feet cleaned, Intertrack Side	81,187
Average feet per machine hour, Shoulder Side	951.0
Average feet per machine hour, Intertrack Side	904.1
Average track feet (both sides) per machine day	2089

These results were accomplished by the Nordberg "Threesome" with a foreman and 22 men . . . none of whom had ever seen these machines before. The best day's production with the Four Cribex was 2,829 half-cribs in 5½ hours actual on-track time. Best production for the Ballastex-Screenex on shoulder was 5,538 ft. in 5½ hours. Best intertrack production was 5,280 ft. in 4½ hours.

For further details of the money-saving ability of these machines, write for BULLETIN 174.

AVAILABLE FOR DIRECT SALE OR LEASE...

R550

Look to NORDBERG

. . . for continually improved TRACK MAINTENANCE MACHINERY *to do a Better, Faster Maintenance Job at Lower Cost*

NORDBERG MFG. CO., Milwaukee 7, Wisconsin

Net Earnings Up —

But No Easing of Maintenance Problems in Sight

A combination of significant trends or events is now taking place in the railway industry. Supervisory officers in the maintenance department should take careful note of these developments and evaluate them in relationship to their own responsibilities. The fact is that the happenings referred to have a direct bearing on these responsibilities and on the ability of maintenance officers to carry them out.

Let's start with the sharp increase in railway business that has occurred since the government's war-mobilization program got underway. This uptrend has now proceeded to the point where carloadings are running about 50 per cent ahead of last year. For the week ending Oct. 14, which is the latest week for which figures were available at the time of going to press, loadings of revenue freight, as reported by the Association of American Railroads, totaled 888,559 cars, an increase of 304,611 cars, or 52.2 per cent, as compared with the same week in 1949.

The uptrend in carloadings has been reflected in a substantial increase in net earnings. For instance, the net operating income of the Class I roads in August was $122 million, the largest for any comparable month since the war year 1943. Moreover, this operating net compares with an average for that month of only $86 million in the four post-war years 1946-1949, inclusive. While total operating revenues in August ($890 million) were the largest for any August in history the increase in operating net was partly attributable to an *apparent* increase in operating efficiency, as indicated by the fact that the ratio of operating expenses to gross earnings was only 70 per cent, as compared with 79 per cent in August, 1949.

The word "apparent" in the foregoing sentence is used and italicized because it is practically a certainty that, if expenditures for maintenance of way and structures had been made in August in the amounts justified by the wear and tear imposed by the precipitous increase in carloadings, these expenditures (and possibly others, too) would have been substantially higher and net operating income would have been correspondingly lower. The fact is, however, that maintenance expenditures for August were largely determined months in advance at a time when railroad business was at near-depression levels, and when there seemed to be very little likelihood of any substantial upturn. Hence, to the extent that maintenance expenditures in August fell short of the needs of the properties, the higher net earnings in that month were more apparent than real.

The railroad brotherhoods, however, have their own view of the situation. They see that the earnings of the carriers are suddenly higher and they are determined to siphon off *all* the increased earnings, whether real or apparent, for themselves. Their intentions in this respect are revealed by the recent demand of 15 non-operating brotherhoods for a raise of 25 cents an hour, and that of the Brotherhood of Locomotive Firemen & Enginemen for an increase of 35 cents an hour. It is estimated that these new demands, if granted in full, will virtually absorb all net income, making it extremely difficult for the carriers to maintain their properties adequately or to carry out needed improvements.

Supervisory officers in the maintenance department will be making a mistake if they assume that the problems confronting them will become less difficult because of the current increase in earnings; the brotherhoods will see to that.

FALL SURFACING—

Provides Lasting Benefits If Done Right

TRACK that gets a good detail surfacing in the fall will not only ride well during the winter, but will require little, if any, work in the spring. However, if fall surfacing is done hurriedly and incompletely, spring will unquestionably find the track "sloppy".

From observations, through the years, of fall surfacing as it is often practiced on many railroads, it would appear that some foremen think "anything goes" when it comes to getting their track ready for winter. They seem interested only in getting a lot of track tamped a little so as to get as much of their sections covered as possible. They "don't have time" to do the job right—only time to do twice as much half right. Then in the spring, when the results of their fall handiwork and hurry become evident in the form of loose or broken ties, mud, and generally poor surface, they invariably place the blame on a "tough", a "wet" or a "freezing-and-thawing" winter. The lack of thoroughness with which their fall surfacing was done has been long forgotten, only the amount surfaced is remembered.

While walking track the other day, a supervisor pointed out some of the mistakes his foremen had made in their "hurry", and mused about the poor results that would undoubtedly be apparent next spring if the mistakes were not corrected. First he told of having called the attention of his gang leaders to certain "rough spots" that should be fixed before winter. He admitted at the start that part of the fault might be his for having made his list too long and thus had "scared his foreman into too much speed," but he was quick to deny that he had put production before quality.

This supervisor went on to point out some of the undesirable results that had already become evident following the "fixing" of some of the rough spots. The evidence of hurry was unmistakable. Some of the ties had been tamped only on one side and only outside of the rail; and, at one of the joints that had been surfaced, a bolt was still loose. But worse than anything else, in his opinion, was the fact that after the tamping had been completed, **the cribs had never been refilled with ballast.**

To him, this was the unforgivable sin of fall surfacing. He pointed out that the holes left in such a manner form a reservoir to accumulate snow and ice, which in melting would drain directly under the tie and assure a "pumping" condition in the spring. The truth of this contention was self-evident, for rain that had fallen since the spot had been "fixed" had already started a puddle of mud—something that had not even been visible prior to the "surfacing". Finally, the poor line that had developed before the work was done was still in evidence—a condition that could only be corrected during the winter by spike lining or left to get worse and worse.

Disappointed as this supervisor was, he expressed a hope that he could salvage something from this wasted effort by using these "bad examples" as object lessons with which to convince his men that, in surfacing track for winter, it may be commendable or even imperative to get as much done as possible, but at no other time of the year is it more important to do all work in the best way possible.

PUBLIC PROJECTS—

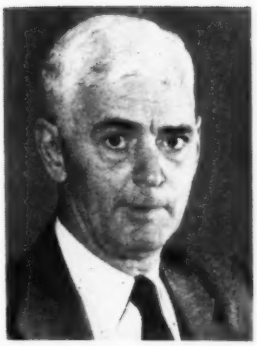
Management Should Know About Them

IT SOMETIMES happens—and all too frequently—that public improvement projects get under way without the responsible railroad officers having been notified in advance. These projects may relate to highways, paving, the re-zoning of property, drainage districts, sewer systems, and similar improvements, which, while being highly desirable from the viewpoint of public service, may contain objectionable features from the railroad's standpoint. By having advance notice of an improvement or of a proposed ordinance, the plans for the project can be studied by a railroad representative and the objectionable features can generally be amicably eliminated, or else the railroad can file legal objections. However, after work has been started on a project, a change in plans is difficult to bring about without incurring the resentment of the other parties, and it is often too late to file objections.

Even though some improvements may not be too well-conceived and may be expensive, the railroad, which so often is the largest taxpayer, is frequently expected to participate heavily in the cost. On the other hand, while some projects may not involve any expense on the part of the railroad, they may have an adverse effect on the use of railroad property, on visibility, or on the maintenance problems of the road.

Although it is true that station agents are normally considered to be the railroads' local representatives, and as such are charged with the responsibility of safeguarding their employers' interests, these men are not infallible and may not sometimes become aware of a contemplated public improvement. Frequently, the only advance notification of such an improvement may be a notice tucked away in some obscure portion of the local press, or perhaps it may be a poster tacked onto some telephone pole.

Section foremen, roadmasters and supervisors also have a responsibility for safeguarding the interests of the road for which they work. It is in their own interest that they should be alert for any outside influence that will result in their employer being placed at a disadvantage in any way. Hence, whenever a contemplated improvement comes to the attention of a section foreman or supervisor, he should promptly inform his superior, preferably in writing, enclosing a press notice if possible. Don't worry about whether others may be doing the same thing; it is better that management receive notification from several employees than from none at all.

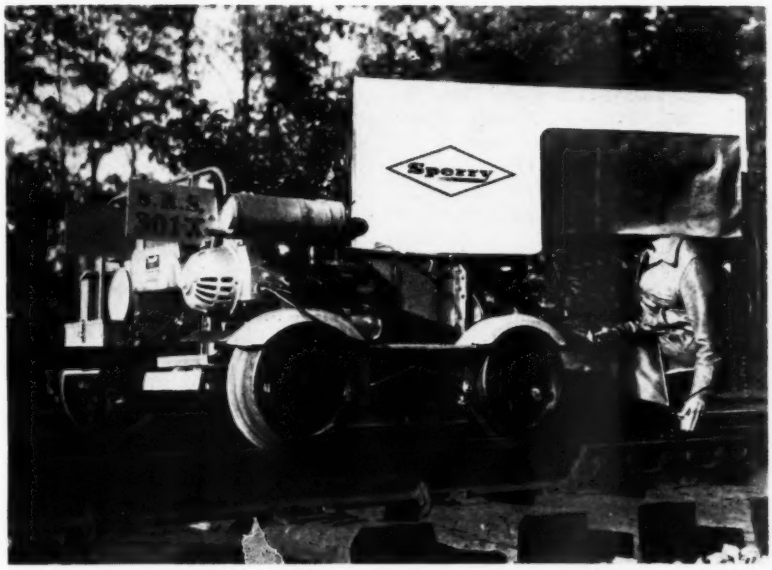


Ultrasonic Rail Testing

On the New York Central

By C. B. BRONSON
M. of W. Assistant to Vice-President
New York Central System
New York

Experience on the New York Central, as explained in this article, is that the ultrasonic method provides an effective and economical means of determining defects in rails within the joint-bar limits. Following two preliminary demonstration tests this road contracted to have approximately 125 mi. of track tested by this method. Observations based on the results of this testing work are given in this article.



A Sperry ultrasonic rail-test car in action, showing how the operator on a swivel-mounted outrigger seat at rear passes a searching unit over rail head at joints and views reflected impulses on a cathodic-ray screen covered by a magnesium hood

• Rail-flaw detector cars have been performing yeoman service for almost a quarter of a century in locating transverse fissures and other transverse defects in the heads of rail, as well as various types of split heads. Their performance has been of untold value to the railroads as a safety measure.

The detection of failures in the web of the rail has been less efficient, and one of the chief faults of all detector cars has been their complete inability to locate defects in rail within the limits of the joint bars. In particular, they have been unable to detect incipient bolt-hole cracks or head-and-web separations in the upper fillet, which extend in a generally longitudinal direction.

The importance of rail failures within the joint-bar limits is attested by the most recent report of the Rail committee of the American Railway Engineering Association, which includes data showing that approximately thirty-five per cent (3.34 failures per 100 track-mile years) of all failures in control-cooled rail occur within the joint-bar limits. Head-and-web separations are considerably less troublesome since the number of rails which fail in service due to this type of defect is considerably smaller than the number of rails which fail in service due to bolt-hole cracks.

Until recently, the only means of locating bolt-hole cracks has been by visual inspection, that is, by removal of the joint bars and scraping of the rail webs. This method is slow, cumbersome, costly and not too efficient. The head-and-web separations are even more difficult to locate by visual inspection. Furthermore, the chances of missing either type of defect are considerable unless the rail is very thoroughly wire-brushed prior to the actual visual examination.

Within recent years, Sperry Products, Inc., developed an ultrasonic device for the non-destructive testing of axles and crankpins without the necessity of tearing down the equipment for examination. During the past year, Sperry adapted the basic principles of the axle-testing device to the testing of those portions of rails inside the limits of joint bars. The rail-testing equipment* consists of a standard inspection car modified by the addition of an auxiliary electric drive for propelling the car during testing; a device which automatically spots the car in testing position at each joint; a swivel-mounted outrigger seat for the operator; a gasoline-driven generator set; and the ultrasonic detection equipment which is a special design developed particularly for testing rail inside track structures.

The searching unit is a quartz crystal mounted in a plastic and metal holder, which is moved parallel with the track along the running surface of the rail. Defect indications are presented on the viewing screen of the detection equipment. The operator of this equipment, which is called an ultrasonic detector car, sits on the outrigger seat where he can observe the indications received on the viewing screen, as well as con-

*A more detailed description of the ultrasonic test equipment appeared in the December, 1949, issue, page 1204.

Fig. 1

Fig. 2

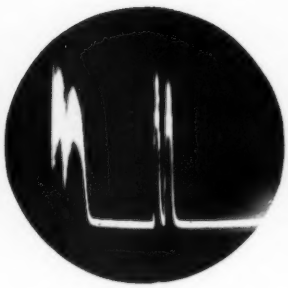


Fig. 3

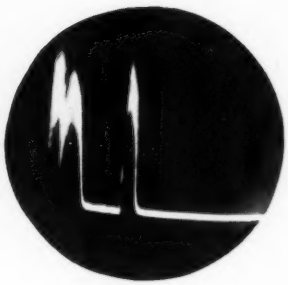


Fig. 4

Four typical indication patterns seen on the cathode screen when testing rail with the Sperry ultrasonic detector car

Fig. 1.—A typical indication obtained from sound rail without discontinuity

Fig. 2.—Typical pattern obtained when the ultrasonic beam strikes a bolt hole

Fig. 3—Pattern resulting from a bolt hole (right) and a bolt-hole crack (left)

Fig. 4.—Typical indication pattern obtained from a head and web separation

Head and web separation in 131-lb rail detected by a Sperry ultrasonic detector car. End of the rail has been ground slightly to show extent of the defect

This bolt-hole crack in 131-lb rail was spotted when an indication similar to Fig. 3 above showed up on screen

trol the movement of the car from one joint to another during testing.

The car is stopped at each joint, and a survey is made with the searching unit. Then the car is automatically moved to the opposite joint and the same procedure is followed.

Tests Show Possibilities

We had our first experience with the ultrasonic detector car in October, 1949, when a demonstration test was made on the New York Central east of Buffalo by Sperry Rail Service. Subsequently a similar demonstration was made in the general vicinity of Chicago on our property west of Buffalo.

These two preliminary demonstration tests indicated important possibilities and potential value in a device of this type. As a result, we contracted for approximately 125 mi. of testing. We mapped out the program by the selection of certain stretches of track where bolt-hole cracks had been causing rail failures with some frequency. In other words, the testing was not continuous by any means for there are numerous stretches of track where bolt-hole failures have been fairly infrequent.

The testing started on the Lines West of Buffalo in the general vicinity of Sandusky, Ohio, about the middle of December, 1949, and since that date, first one and then a second ultrasonic car have been in continuous testing, originally to a limited extent on the territory west of Buffalo, and then to a much greater extent on the territory east of Buffalo. There were a number of interruptions during the winter on account of either extreme cold weather or snow storms.

The average number of sections of rail within joint-bar limits tested per day was somewhat less than 300 during the early period of the test, but the rate of testing has since been speeded up, with the result that it is not uncommon for 400 to 500 such section to be tested daily. This better performance was due to a considerable extent to the improvements which had been made to the ultrasonic detector car during that period.

Ability Is Uncanny

The ultrasonic detector car is almost uncanny in its ability to locate defects. Cracks which are just barely visible in the bolt holes are detected with the highest degree of accuracy. The larger bolt-hole cracks, of course, are easy to distinguish. Similar results have been obtained with head-and-web separations, some of which have been in the order of less than ¼ in. in length, and measuring only 1/32 in. to 1/16 in. transversely to the web. In fact, when the joint bars have been removed and a check is made of these fairly minute cracks, a magnifying glass is often required to see them.

We had anticipated finding a larger number of bolt-hole cracks by the ultrasonic method than previously by the visual inspection method. We were surprised to find a much larger number of head-and-web separations as the testing proceeded. The reason for this seems to be that bolt-hole breaks in service occur with some frequency, whereas the head-and-web service failures are relatively few and far between. However, the reverse is the situation as far as ultrasonic testing is concerned. To illustrate, the general run of bolt-hole cracks found was 20 per cent of the total, while the head-and-web separations equalled 80 per cent, or four times as many as the bolt-hole cracks.

During the demonstration testing last fall, we ran into a limited number of head-and-web separa-

tions. Some of these rails were left in service with the intention of determining the rate of growth in a period of about six months, which is the expected interval between tests. However, the number of head-and-web separations left in service was small, so we have not acquired much information on the rate of growth, or propagation, of these lengthwise cracks in the rail fillets. As time goes on, we will acquire more information of a broader nature as to this question of rate of growth of head-and-web separations. Of course, in the case of checks and cracks in bolt holes, it is considered essential as a precautionary measure that such rails be removed from track.

Important Safety Development

The development of the ultrasonic detector car is indeed a major step forward in the furtherance of track safety, since it insures a positive and definite method of locating defects within the limits of the joint bars, without removing the bars. The cost of removing the bars for this purpose is approximately twice the cost of operating the ultrasonic testing car. Furthermore, in ultrasonic testing, it is necessary only to remove the bars at the joints where the actual defects are detected, and not all of them as had been the case where visual inspection methods were used.

There was a wide variation in the number of defective rails found in each stretch of track. There was even a wide variation between adjacent miles, which was undoubtedly influenced by such factors as train speed, curvature, and soft roadbed.

The Sperry ultrasonic detector car can also be utilized for the testing of rails within highway crossings, at the heels of switches, at frogs, and inside platforms, etc. It is hoped that in time the same principle can be utilized for the testing of crossing frogs of the open-hearth type.

There is no doubt in my mind but that the ultrasonic detector car will have an immediate and widespread use for the purposes enumerated above. It is certain that, as far as the New York Central is concerned, we will rely on this device to aid us in weeding out rails which are defective within the limits of the joint bars, and also in other locations as mentioned above.

Wood Preservation Slightly Less in 1949

• A total of 290,555,934 cu. ft. of wood was given preservative and fire-retardant treatment in 1949, according to the annual report compiled by Henry B. Steer, Forest Service, United States Department of Agriculture, in cooperation with the American Wood-Preservers' Association. This was 1 per cent less than the 292,357,303 cu. ft. treated in 1948.

Crossties again constituted the largest single category of wood products given preservative treatment in 1949, a position they have not relinquished since 1909, but which is now being threatened by the increasing treatment of poles. The number of crossties treated was 40,025,189—2.8 per cent less than in 1948.

As was the case in 1948, approximately 66 per cent of all crossties given treatment were treated with creosote or creosote-coal-tar solutions and about 34 per cent with creosote-petroleum solutions. The remainder of less than one per cent was treated with other preservatives, including chromated zinc chloride, petroleum-pentachlorophenol solution and creosote-petroleum-pentachlorophenol solution.

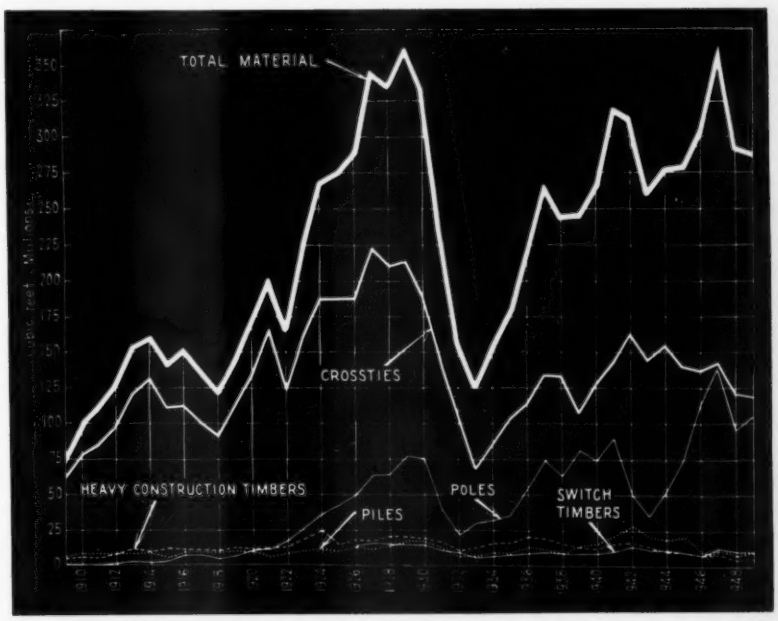
Switch ties treated in 1949 totaled 10,862,832 cu. ft. or about 6 per cent less than in 1948. Preservatives were used in the treatment of switch ties in about the same proportion as in the treatment of crossties.

The quantity of wood given fire-retardant treatment in 1949 was 8,038,637 ft. b.m. or 16 per cent less than was reported in 1948. This treatment required the use of 1,348,757 lb. of dry chemicals, including chromated zinc chloride, Protexol and Minalith.

Wood-preserving plants reported a consumption in 1949 of 237,699,984 gal. of liquid preservatives, and 7,801,163 lb. of solid preservatives. This was an increase of about 1 per cent in liquids and a decrease of 26 per cent in solids. Among the liquid preservatives, creosote and creosote-coal-tar solutions predominated with a total consumption of 200,504,952 gal. or an increase of about 3,000,000 gal.

Quantities of Various Classes of Timber Products Treated in 1949

	Quantity	% Change from 1948
Crossties	40,025,189	−2.8
Switch ties	130,353,984 ft. b.m.	−6.0
Piles	16,255,824 lin. ft.	+2.9
Poles	6,031,746	+8.8
Wood Blocks	863,008 sq. yd.	−58.7
Constr. timbers	77,307,118 ft. b.m.	+14.7
Cross arms	2,246,196	−0.2
Miscellaneous	388,381,719 ft. b.m.	−11.5



A graphic record of the volume of wood treated in various categories since 1909

Accidents Don't "Just Happen"

By M. L. HORTON
General Roadmaster
Atlantic Coast Line
Florence, S. C.

This article is abstracted from a paper read by Mr. Horton at the recent twentieth annual meeting of safety committee chairmen of the Atlantic Coast Line. In it he discusses the responsibilities of supervisors in ferreting out and correcting the unsafe acts or unsafe conditions that cause accidents in the maintenance of way department.

The supervisor should explain clearly and in logical order the instructions and rules under which employees must perform their work.

• Honest investigations of accidents disclose first of all that they are "caused". This simple statement should be strongly emphasized to combat such false ideas as: "If your number is up, its going to get you", "accidents are bound to happen", etc. Such thinking overlooks the possibility of preventing accidents. Actually, every accident is caused by some personal or mechanical failure. The supervisor who recognizes very clearly that all accidents are caused, and that their causes may well be unsafe acts or unsafe conditions in his department, has crossed an important threshold in his thinking, and has entered a field that permits him to seek out and correct accident causes.

Accidents Defined

Often the question is asked: "What are accidents?" The answer is likely to be "cuts, bruises, fractures, etc.", because many of us have the idea that an accident has occurred only when an injury has resulted. Obviously, accidents and injuries are not the same. An accident is a mishap. It does not have to result in injury to anyone or damage to anything. Therefore, we should not wait until an injury occurs as a result of an accident before we interest ourselves in the prevention of a recurrence. Further, a supervisor should know something of accident types to understand how accidents can be prevented. We as supervisors must recognize unsafe acts and unsafe conditions and overcome them before accidents occur.

Who Is a "Supervisor"

We speak of "supervisors", but just who should be considered a supervisor in any discussion of safety? In my opinion, he is any person who directs the activities of another person in connection with his work. Therefore, he may be a foreman, an assistant foreman or an apprentice foreman as well as a supervisory officer.

In many cases, the cause of an accident is shown to be the "carelessness" of some individual. But should it not be termed "thoughtlessness" instead? For carelessness implies that the individual did not care if he was injured, which, of course, is not true. Everyone wants to avoid injury, but sometimes we fail to think about the possibility of an accident occurring to us. It is the failure to think ahead that often contributes to an accident. Therefore, we should teach each employee to the best of our abilities to keep his mind at all times on the work being performed, never letting it wander, and to think about how to perform his work properly and safely.

Next let us consider the problems involved in the employment of personnel and in job instructions. Regardless of the amount of experience a person has had when he enters our department, he should be considered a new employee, because his previous training may be entirely different from our methods. The supervisor should carefully screen the person to be employed to determine that he is capable of performing the job to which he will be assigned. In many cases, a new employee is nervous and anxious to please. Consequently, the supervisor or foreman should first put the person at ease, arouse his interest, and find out what he knows about the job.

Secondly, the supervisor should explain to him in logical order the rules and instructions under which he must perform his work. Finally, after a period of time, the

new employee should be tested to see if he can perform his duties alone. Often the worker who is doing the job improperly has not been fully instructed, or he has been assigned to a job that is beyond his capacity. Hence, every supervisor should frequently check to see that the worker thoroughly understands the rules and special instructions.

Enforcing Safety Rules

The question often arises as to what to do about enforcing safety rules in the case of an individual in the department who, for some reason, is unable to understand the value of obeying such rules. At times, it is necessary to take some action to impress such workmen with the need for following instructions. In general, the enforcement of safety rules is not difficult if the supervisor has demonstrated the right kind of leadership. The supervisor must set the pattern for the employees to follow. You cannot expect any group of employees to obey rules which are not also obeyed by their supervisor. "Do as I say and not as I do" is not the kind of leadership we need. Lead men properly and they will follow safely.

Safety Suggestions

Listed below are a few suggestions which, if carried out, will prevent many accidents:

1. Obey all rules and special instructions.
2. Observe employees when they report to work to see that they are in a fit condition to perform their work.
3. Observe employees' clothing and do not permit them to wear ragged shoes, loose clothing, etc.
4. Check all tools to see that they are in good condition. If they are not, do not permit them to be used.
5. Check motor cars and push cars before being used to see that they are in good condition.
6. Be alert throughout the day for unsafe practices or unsafe conditions and see that they are corrected.
7. Encourage the use of safety shoes.

Fundamentally, safety is just a way of life. It is the development of an attitude that permits one to think about the possibilities of accidents and how to prevent them. It is impossible to believe that a man has the "safe attitude" if he thinks about safety for just a small portion of the day. To be safe, one must be alert during all his hours of wakeness.

Typical Personal Injury Accidents

By H. L. SLEMP
Roadmaster, Atlantic Coast Line
Jacksonville, Fla.

In a talk before the twentieth annual meeting of safety committee chairmen of the Atlantic Coast Line, Mr. Slemp discussed the four personal injury accidents described herein, pointing out how easily each of them could have been prevented.

• It seems to me that no difference of opinion exists as to the need for diligent effort to eliminate personal injury accidents. And it is not difficult to state the reasons for this agreement. We are all interested in self-protection, increased efficiency, financial savings, and the elimination of unnecessary human suffering. Accident work is big business, and, if we expect to succeed, we must pursue the work in an intelligent manner.

The following discussions of four typical personal injury accidents bring out the facts that many accidents result from practically the same cause, and that we should be alert to remind workmen of the necessity for straight thinking.

THE CASE OF THE UNTHINKING LABORER—In replacing the bolts in the heel block of a switch, a jack was used to spread the rails to provide enough room to install the bolts. As a section laborer was installing the bolts, under supervision of the section foreman, the jack slipped, allowing the rails to close and catch the laborer's fingers between the heel block and the stock rail. If the section foreman and the laborer had only stopped to **think**, they would have taken the proper precaution to prevent the rails from closing in case the jack should slip. This could easily have been done by placing a block or some other object between the rails.

THE CASE OF THE UNCONCERNED WORKMAN—A section force, in adjusting a guard rail, found it necessary to rip up the guard-rail plates. The spikes holding the plates were hard down, and to get a claw bar under the spike heads, it was first necessary to pry up the guard rail plates to loosen the spikes. While a section laborer was prying up the plates with the sharp end of his claw bar, the bar slipped, causing the laborer to fall. In falling his finger was caught between the bar and the rail. He had failed to get the sharp end of the bar far enough under the plate to insure a good hold. In this case, it is plain that the man did not have his mind on his work, but was just working along in an unconcerned manner.

THE CASE OF THE WANDERING MIND—Two four-man section gangs were skidding 85-lb. rails from a push car to a flat car. As the last rail was being loaded, a section laborer, stationed at one end of the rail, held on to the rail after it had been placed on the car, with the result that the end of his thumb was caught between the rail just loaded and one of the rails on the car, mashing the end of his thumb. This man said he did not know why he held on to the rail except that it was the last rail and he was trying to shove it farther over on the car. This is a case where the man **quit thinking** just before the job was completed.

THE CASE OF TOO LITTLE COORDINATION—Many personal injury accidents occur when it is necessary to combine two gangs to perform a task. This, as you all know, means a single unit being supervised, or, as the men say, "bossed" by two foremen. I have in mind two section gangs that were unloading and stacking 5-in. by 12-in. by 12-ft. crossing timbers. One of the forces was unloading the timbers from a car and the other force was on the ground stacking them. The ground force was stacking the second pile when one of the timbers being placed on the stack fell and struck one of the laborers on the foot, breaking a bone. The injured man stated that he and three other men, two men on each end, were placing a timber on the stack when the end he was helping to lift struck another timber on the stack, bounced back, and fell so quickly that he did not have time to get out of the way. Both foremen stated that they did not see the accident as they were at the opposite end of the stack. This is a case where the men were not working together because of lack of co-ordination.

The necessity of minimizing the travel time of maintenance gangs is emphasized in this article which is an abstract of an address presented by Mr. Kellogg before the convention of the Roadmasters' Association in September. He explains how this is accomplished on his road by the use of trucks and other expedients. Getting more cooperation from the operating department where motor cars are used, and achieving greater efficiency in the use of machines are also discussed.

For yard crews and extra gangs the Pere Marquette district of the C. & O. uses a 1½-ton stake-body truck with a removable shelter house for the men

Reducing Unproductive Time of

By H. W. KELLOGG
Division Engineer
Pere Marquette District, C.&O.
Detroit, Mich.

• During the past year we have had numerous occasions to realize the full significance of the five-day work week. When we estimate a certain job should take 4 weeks to complete we now have to realize that 4 weeks is only 20 working days instead of 24. However, we still have our regular maintenance program to carry out with approximately the same number of men that we formerly had under the six-day week.

Many railroads have reorganized the forces of the maintenance of way department in an attempt to increase their overall efficiency. In many instances, small section gangs have been eliminated and more work is carried out by larger floating or extra gangs. The time consumed by track forces, whether they be section gangs of 2 or 3 men, or extra gangs of 30 to 100 or more men, going to and from their headquarters to the place of work and returning, is unproductive, yet it must be paid for at the same rate as the men are paid while engaged in productive work.

It is our duty and responsibility to give serious and conscientious study to the problem of reducing the unproductive time as much as possible. Each railroad has its own particular problems which are created by its geographical and physical location, the amount of traffic carried, and the amount of money available. Consequently, what can be applied to one road may not be practical or even possible on another. Hence, there are a number of methods that have been used to eliminate unproductive time.

Trains Cause Largest Loss

First, the greatest percentage of unproductive time may be charged to train delays. Consequently, where it is possible to do so, many of the train delays can be eliminated by transporting men, including section men and extra gangs, by off-track equipment such as motor trucks. This method of transportation is only possible where the highways are parallel to or cross the railway at regular intervals, or where the railway right of way is such that it may be graded with a bulldozer or grader to smooth it sufficiently to provide a roadway for motor vehicles.

The importance of the need for reducing travel time can be well illustrated by reviewing the growth of our sections in miles of track during the last 50 years. In 1900, when we had single-track mainline sections 4 mi. long, the means of transportation was the hand car. Then came the motor car and the sections were increased to 8 mi. Today, with the 5-day work week, we have 14 mi. of main line on an average, each manned by a foreman and 5 men, which is about the same number of men we had on a section in 1900.

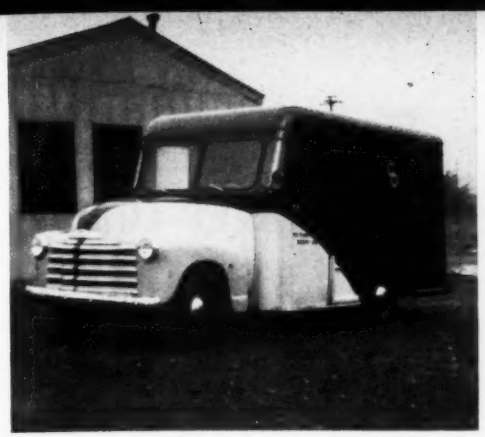
When we consider the type of truck best suited to the various uses that may be required of it on a railroad, it is my experience that, in asking 50 men what would be their recommendations, we would receive 50 different ideas.

On the Pere Marquette district of the C. & O. we use, for regular section crews consisting of a foreman and up to five men, a ¾-ton pick-up truck with a top over the box consisting of plywood covered with canvas. Seats are built lengthwise along the sides of the box with space beneath them for tools. A number of these truck have been in service six years and I expect at least six more years service from them. They have proven satisfactory and their average operating cost is 4.7 cents per mile.

For yard crews and extra gangs we use a 1½-ton stake-body truck with a shelter house for the men. This shelter is equipped with seats and may be removed at any freighhouse dock in a couple of minutes if it is desired to use the truck for hauling material. For the bridge and building and water service departments we have designed special bodies to fit their individual requirements.

On many territories it is impractical to provide motor-truck transportation either due to the topography of the country or for various economic reasons, and in such territories motor cars must still remain the means of transporting men.

In past years it has been my ob-



Left—A ¾-ton truck for section gangs having up to 6 men. Middle—Right of way graded to provide roadway for trucks. Car in picture is a ¾-ton pick-up truck used by track supervisor. Right—Section foreman using portable telephone plugged into jack box

M/W Forces

servation that there has not been too much attention given to the delays to section crews going to and from work. In most instances motor cars were operated on a lineup and timetable. The foreman would stop work early enough to give him sufficient time to return to headquarters by quitting time. Many dispatchers would give the section foreman a lineup as to the location of trains and then it was the responsibility of the foreman to get his crew and motor car over the road safely. Under this system many valuable productive hours of work were lost due to delays caused by trains.

In reducing train delays the cooperation of the operating department must be secured. It is often the case that operating officers frequently do not realize the number of hours lost by the track forces in clearing for trains. If the facts on this point are given to the division operating officers I believe they will be willing to cooperate to the best of their ability to provide better train information on lineups, and to give all the assistance possible to get section motor cars over the road safely and with the least possible delay.

Portable 'Phones Valuable

Section foremen are often at a disadvantage when they are working at a location where they do not have access to a telephone to call the dispatcher. This obstacle can be eliminated by providing the foreman with a portable field telephone. However, in some localities, due to the large number of wires carried on the pole line, the foreman frequently gets connected on the wrong wires, causing another circuit to be fouled. This trouble was experienced on my division, and, as an experiment, we installed a jack box for the dispatcher's circuit on the telephone pole adjacent to each milepost on a 150-mi. subdivision. Each foreman, patrolman, and signal maintainer was then provided with a portable hand 'phone which he could plug in at the jack boxes. Very satisfactory results have been obtained from this experiment.

In order to get the most productive work possible per day from large extra gangs engaged in out-of-face program work, such as rail laying and ballasting, careful planning and cooperation with the operating department are required. The out-of-pocket payroll cost for a gang of 125 men and the supervision is approximately $175 per hour at the pro rata rate and $262 per hour at the punitive rate. From these figures it can easily be seen that unnecessary delays to a gang of this kind are costly and do not take long to increase the labor cost of this work beyond the amount allotted in the budget. Before starting a ballasting or rail-laying job a meeting of all the division staff officers should be held and ways and means determined whereby the work may be carried out with the least possible delay. A memorandum of these plans is then given to each officer and supervisor directly connected with the work so that each man knows how the work will be progressed. Advance planning such as this will go a long way toward reducing the unproductive time of extra gangs.

Not all unproductive time can be charged to train delays. We are all aware of the advantages and efficiency of labor-saving machinery in connection with our work, and the management of the railroads has invested large sums of money in these machines. It is our responsibility to plan our work so as to get the maximum amount of service from each machine. A machine that is allowed to stand idle does not produce a fair return on its investment cost. Some track supervisors—and I have been guilty myself—like to keep a machine on their territory even if they have no immediate use for it because they foresee a need for it next week or month. In the meantime, a supervisor on another territory may have immediate need for that same machine. Therefore, there must be good cooperation between all supervisors to get the most efficiency from the machines available.

Proper Care of Machines

Frequently, a supervisor will receive one or more machines from another supervisor for the purpose of doing a specific job, but the machines will either fail or not be in good operating condition and much productive time will be lost. An investigation usually brings out the fact that the failure was not due to any fault in the construction of the machine but to lack of proper care or lubrication. We must constantly make certain that machine operators give their machines proper care if these machines are to produce the work for which they were designed.

Our goal is to raise the efficiency with which we maintain our railroads. This requires more diligent study of the methods now employed and the development of better and more economical means of performing various kinds of work. In other words, we will have to find new ways to do old things.

Highway-Railway Car Cuts Section-Gang Travel Time

By **SHERWOOD WILLIAMSON**
Division Engineer
Louisville & Nashville, Corbin, Ky.

Above—The Hy-Rail car just out of garage and ready to go to work. Section Foreman I. H. Rowlett is looking over lineup to determine whether to go by rail or highway

Right—Having a clear track, Foreman Rowlett decided to make the trip by rail, and, while doing so, to haul ties to the job

• The Louisville & Nashville was recently confronted with the problem of reducing unproductive man-hours in transporting track forces, tools and materials to and from work on a part of its Cumberland Valley division. The use of ordinary highway trucks for this purpose was ruled out because of the nature of the terrain. The territory involved, serving coal mines in southeastern Kentucky and southwestern Virginia, might well be called a "tree top" railroad. Many stretches of track are not accessible from the highways that run in the valleys.

The introduction of the Fairmont Hy-Rail car, which is equally at home on the track or on highways, appeared to be a solution to the problem, and about a year ago one of these cars—the first to be sold to any railroad in the United States—was placed in service at Harlan, Ky. When the Hy-Rail car was received at Harlan, Section 52 at Gulston, Ky., was abolished. The trackage and men of this section were absorbed by Section 45 at Harlan. The latter section now maintains 33.86 mi. of track, including the facilities at Harlan and the tracks of seven coal mines.

This article is adapted from an article which appeared in the June issue of the L. & N. magazine.

The Hy-Rail car is simply a jeep carrying a body designed for the transportation of men and tools. Its wheels are equipped with high-pressure tires that travel either on the rails or on the highway. Attached to the front and rear of the car are flanged guide wheels, operated by hydraulic lift, which are lowered when running on the rails and raised when on the highway. They carry no weight, as the flanges merely guide the car when on the rails to prevent its derailment.

Route Change Is Easy

The change from rails to highway, or vice versa, can be made at any ordinary highway crossing. This sometimes requires "seesawing", but with experience it is a short operation. If necessary the car can be derailed anywhere by lifting the guide wheels and steering the car off the rails. It is not difficult then to rerail the car with the aid of tapered wood blocking to act as ramps.

The body of the Hy-Rail car has a rear-end entrance, side windows and a long seat on each side. Under the seats are long compartments, opening outside. One has two sections divided to hold lunch boxes, small tools, etc. The other compartment is used for long tools such as clawbars, level boards, etc. The car has a seating capacity of 9 to 11 men, depending, of course, on the size of the men.

Operating the Car

The Hy-Rail car operates by rail when train movements are favorable. But in normal times from 18 to 25 trains operate over some part of Section 45 during the working hours of the gang. Consequently, many occasions arise when the car must take to the highways. This is particularly true early in the morning on one line when an "owl" crew is still out, or in the evening when the gang is coming in and the mine crews are going out. About 60 per cent of the car's travel is by rail. Before placing the car on the track, the foreman gets a line-up on trains. Last winter the Hy-Rail car traveled over frosty rails that ordinarily would halt a motor car on the steep grades.

The results obtained with this car have been satisfactory. Considerable time has been saved in reaching points of work in the morning and in returning in the evening.

Convention Review —

Bridge and Building Association

Practical Problems Get Attention at Chicago

Reports of seven technical committees are presented at fifty - fifth annual meeting of bridge and building group. Special events add zest to gathering.

• Many railway supervisory officers with jurisdiction over the maintenance of bridges and buildings were given new slants on old problems during the fifty-fifth annual convention of the American Railway Bridge & Building Association, which was held at the Stevens hotel, Chicago, September 18-20. This came about largely through the presentation of seven technical committee reports that were devoted in large part to the discussion of modern ways of dealing with problems that have existed for a long time. Continuing the practice started in 1946 this meeting was held concurrently, but separately, with the annual convention of the Roadmasters' and Maintenance of Way Association.

An account of the Roadmasters' meeting was published in the October issue. That account reported various activities in which the two associations participated jointly. These included a combined opening session on Monday, September 18, and another joint session on the afternoon of the following day, at which three addresses on subjects of mutual interest were heard. Other features of the concurrent conventions, as summarized last month, included a record display of manufacturers' products, which was staged jointly at the Coliseum by the Track Supply Association and the Bridge & Building Supply Men's Association. Another event shared by the two meetings was the annual banquet which was tendered to the members of the two railway groups and their families by the supply associations.

Convention Pictures

On the following pages are presented photographs snapped in the Stevens hotel during the Bridge & Building and Roadmasters' conventions. Additional pictures taken during the meetings appeared in the October issue.

Record Attendance

The combined attendance at the two meetings was of record proportions. During the three-day period 897 railway men and 262 supply men registered at the meetings, the aggregate attendance being 1,159 members and guests. At the 1949 meetings the registration consisted of 808 members and guests, while in 1948, when the previous high was achieved, a total of 900 members and guests registered.

The separate sessions of the Bridge & Building Association were directed by W. F. Martens, general foreman bridges and buildings of the Atchison, Topeka & Santa Fe, San Bernardino, Cal., and president of the association. He was assisted by W. A. Huckstep, general building supervisor of the Missouri Pacific, St. Louis, Mo., and first vice-president of the association.

The opening feature of the first separate session of the Bridge & Building group was an address by President Martens in which, in addition to giving an account of his stewardship of the association's affairs, he urged the members to cooperate with the railroad industry in its program to win the good will of the public. The association, through its members, said Mr. Martens, "can exercise a considerable influence towards guiding our railroads along the road to popular acclaim." As a prerequisite to successful action on this score "it is imperative," said Mr. Martens, "that the members themselves become thoroughly familiar with the subject." Success in winning public sympathy also depends on salesmanship, and he urged the individual members to become salesmen for railroad service. Mr. Martens also said that we must "forget our own personal ambitions and desires and look only to the good of the organization and the enterprise that provides us with a livelihood."

President Martens at speaker's rostrum

Another event at the opening session of the Bridge & Building meeting was the election of two new honorary members—A. E. Bechtelheimer, engineer of bridges (retired), Chicago & North Western, and T. H. Strate, division en-

Elected at the convention, the new officers of the Bridge & Building Association are . . .

W. A. Huckstep
President

Guy E. Martin
1st Vice-President

F. R. Spofford
2nd Vice-President

Lee Mayfield
3rd Vice-President

H. M. Harlow
4th Vice-President

gineer (retired), Chicago, Milwaukee, St. Paul & Pacific.

The principal business conducted at the meeting consisted of the presentation and consideration of seven committee reports on the following subjects: Types of Treated Lumber and Uses in Building Maintenance and Construction; Construction and Maintenance of Station Platforms; How to Sell Accident Prevention to the Man in the Gang; Installing and Maintaining Waterproofing on Ballast-Deck Bridges; Mechanization and Specialization of Forces; Concrete Piles in Bridge and Pier Construction; and External Protection from Corrosion for Pipe Lines.

After the close of the business session Wednesday noon, September 20, about 60 of those present participated in a bus trip to inspect the new laboratories of the Portland Cement Association at Skokie, Ill. At the laboratories the group, along with other guests, witnessed the testing to failure of a full-size prestressed concrete railroad trestle slab.

In the election of officers at the final business session Mr. Huckstep was advanced to president; Guy E. Martin, superintendent of water service, Illinois Central, Chicago, was promoted from second vice-president to first vice-president; F. R. Spofford, assistant division engineer, Boston & Maine, Dover, N. H., was advanced from third vice-president to second vice-president; Lee Mayfield, resident engineer, Missouri Pacific, Houston, Tex., was promoted from fourth vice-president to third vice-president; and H. M. Harlow, assistant general supervisor bridges and buildings, Chesapeake & Ohio, Richmond, Va., was elected fourth vice-president. L. C. Winkelhaus, architectural engineer, Chicago & North Western, Chicago, was re-elected treasurer. Directors elected were: R. R. Gunderson, assistant bridge engineer, Southern, Washington, D. C.; J. F. Warrenfells, master carpenter, Seaboard Air Line, Savannah, Ga.; and Merwin H. Dick, editor, *Railway Engineering and Maintenance*, Chicago.

The seven committee reports presented during the meeting are printed in full on the following pages, along with abstracts of the discussions that followed their presentation.

Subjects for 1951

Members of the Bridge and Building Association have their work cut out for them during the ensuing year. At the final business session of the convention in September a list of eight subjects was adopted, on which committee reports are to be prepared for presentation at the 1951 convention. These subjects are as follows:

(1) Fire Protection of Structures and Materials.
(2) Accident Prevention in Maintenance and Use of Work Equipment.
(3) Developments in Use of Laminated Timbers.
(4) Protection of Steel Bridges Against Brine Drippings.
(5) Comparative Economies of Materials for Building Exteriors.
(6) Construction and Maintenance of Diesel Fueling Facilities.
(7) Effects of the 40-Hr. Week on B. & B. Maintenance.
(8) Economies in Maintenance and Operation of Heating Plants.

T. M. von Sprecken, assistant to chief engineer, Sou; I. A. Moore, assistant chief engineer, C. & E. I.; J. E. Bernhardt, engineer of structures, C. & E. I.

D. A. Sutherland, supervisor of track; J. J. Brandimarte, master carpenter; A. E. Dulik, general foreman bridges and buildings—all P. R. R.

Types of Treated Lumber and Uses in Building Maintenance and Construction

Report of Committee*

• The railroads today are faced with the problem of selecting the most effective preservative for the lumber and timber used in building construction and maintenance. The native species of timber which are more resistant to termites and decay are too expensive and difficult to secure. As an example, farmers in the east and middle west maintained catalpa groves on their farms to provide a constant supply of 30-year fence posts. They now find it more economical to use treated posts and cultivate their land for other purposes. Some species of timber are more resistant to decay and termite attack than others, but the proper handling and the selection of the most effective treatment for the particular uses will add to the serviceable life of all species. Railroads would spend many more millions of dollars annually if treated lumber was not available.

Southern pine and Douglas fir are the most widely known species of building lumber used by railroads today. Black gum is used for decking where heavy traffic is expected. These species of lumber are highly suseptible to decay and termite attack. They all react favorably to all types of treatment. However, it is necessary to incise fir timbers to obtain adequate penetration of the treatment.

Handling and Storage

Careful handling and storage of treated timber is very important. Creosoted timber should be stacked and covered with dirt if this type of material is not to be used promptly. It is also very important to keep the area around the stacks free from weeds and grass. Every precaution should be observed to avoid any damage which would result in the exposure of the portion not reached by the treatment. Timbers treated with either preservative salts or fire-retardant chemicals should be stored under shelter to protect the lumber from the elements. This material may warp readily and some of the chemicals will tend to leach out under certain conditions of exposure to the weather. Service records indicate that one

R. W. Cassidy
Chairman

salt preservative is fibre-fixed and the problem of leaching is not serious in this type of treatment.

Types of Treatment

Many types of treatment are available today, each having characteristics when combined in building construction and maintenance to provide long life for the structure. Creosote and creosote solutions are most effective preservatives when used in members in contact with the ground. Some railroads recommend that the entire substructure of a building, including the floor joints, be creosoted.

Water and oil-borne salt solutions are most generally used in the framing and exposed wood portions of the building. These types of treatment are clean, provide protection from decay and termite attack, and do not affect the paintability.

Many railroads have found it desirable to use timbers treated with fire-retardant chemicals in the construction of buildings where a fire would result in heavy loss of equipment or freight. This type of treatment is designed to retard the speed of fire and thus permit more effective fire fighting.

The costs of various types of treatment will generally run from 30 per cent to 50 per cent over the cost of the untreated product. This additional cost has proven a good investment in the reduction of labor and material.

Railroads contacted to determine the extent to which treated lumber is used reported that its use is recommended in all building construction and maintenance. The usual preference in construction of roadway buildings is as follows:

Posts, sills and floor joists to be creosoted.

Framing, sheathing, siding, trim and millwork to be treated with water-borne salt chemicals, or other toxic chemicals which can be painted.

In shops and enginehouses containing coal-burning locomotives, salt treatment of the lumber is recommended in the structural portion of the building.

It is emphasized that the roof trusses, columns and other large members should be preframed before treatment to insure the full advantage of the treated lumber. The importance of treating other exposed lumber in these types of buildings is also considered good practice. The use of creosoted wood blocking with the end grain for the wearing surface has given satisfactory service on many railroads. Also the extensive use of creosoted black gum in platforms, walkways and floors has proven economical.

Windows and window frames seem to be the first portion of a building to show signs of decay. The treatment of these items is thought to be of particular importance.

One railroad brought out the fact of using timber treated with water-borne salts having contact with untreated timbers under excessive moisture conditions would result in rapid leaching of the treatment.

The necessity of maintaining buildings with treated lumber was forcefully brought out during the recent war—scarcity of the product and priorities made railway maintenance and stores people find means to extend the life of timber to the greatest. Furthermore it was discovered that, while treated lumber may eventually decay, it can be left in service longer as the sound portion will retain sufficient strength for a much longer period after decay starts than untreated lumber after decay sets in. Knowing this, the bridge and building inspectors will not have the tendency to be extravagant in their recommendations for repairs.

Careful inspection of all buildings programmed for repairs is important to determine what type of treatment of the lumber to be used will provide the most satisfactory service.

*Chairman of this committee was R. W. Cassidy, supervisor of bridges and buildings, Chesapeake & Ohio, Peru, Ind.; vice-chairmen were L. R. Morgan, fire-prevention engineer, New York Central, Detroit, Mich., and E. L. Collette, division engineer, St. Louis-San Francisco, Ft. Smith, Ark.

R. N. Tracy, Armco Drainage & Metal Products, Inc.; C. E. Russell, supervisor water service, I. C.; J. M. Giles, engineer of design, M. P.

Lee Mayfield, resident engineer; W. H. Bunge, assistant engineer—both M. P.; P. W. Hofstetter, assistant bridge and building supervisor, I. G. N.

The effects of treatment on the strength of lumber have been given careful consideration by the treating companies and industries. The results of the following tests indicate that the strength of pieces were only slightly affected:

For the strength tests, the specimens were taken from four coast-type Douglas fir logs. From each log several pieces 4 in. by 8 in. in cross section and 24 ft. long were sawed, after which they were cut into two halves, each 12 ft. long, one to be treated and the other to remain untreated as an end-matched control. A total of five pieces was selected for salt treatment without incising by the standard vacuum-pressure process for green Douglas fir lumber. The pieces were kiln dried after treatment and tested in bending and compression along with the untreated controls. The results obtained are shown in the accompanying table.

Another factor which should not be overlooked is the salvage value of treated lumber used in building construction and maintenance. In many instances railway buildings become obsolete from the standpoint of occupancy, and when retired and razed, the salvage value is much greater when treated lumber was used in the structure.

As a summary, it is thought the railroads as principal users of treated lumber produced today will continue to do so in order to offset the high cost of labor and material in building construction and maintenance.

Discussion

W. A. Huckstep (M. P.) began the discussion by stating that, in taking down a building built of treated lumber at a steam locomotive shop, much of the lumber was salvageable. In razing a building built of salt-treated lumber at Little Rock, Ark., H. Wrights (M. P.) stated that about 75 to 80 per cent was salvaged. This compares with a salvage of 50 per cent of untreated white pine from a similar razing job, according to J. Anderson (M. P.). White pine lumber as good as that used in this structure is not available today, he added.

E. H. Barnhart (B. & O.) questioned the amount of salvage that is being obtained on such jobs, saying that cutting off the ends of the pieces of lumber will materially reduce the percentage. Chairman Cassidy said that when treated tongue-and-groove sheathing was removed from a roundhouse at Peru, Ind., none of the material was salvaged because of nail damage. President Martens stated that he was on a salvage job that required 2½ years to complete, and that almost all of the recovered material had to have the ends sawed off.

Mr. Huckstep cited an instance where all of the lumber recovered from a building was sent to a central plant where the nails were withdrawn and the material sawed, resulting in the salvage of usable lumber worth about $300 per carload after salvage costs had been deducted G. S. Crites (B. & O., retired) stated that lumber is generally reclaimed because of its scarcity rather than its value. If lumber is hard to obtain, he said, it is proper to salvage all the lumber possible, otherwise it is uneconomical.

In response to an inquiry by President Martens about the effect of wood treatments on hardware, S. R. Thurman (M.P.) a member of the reporting committee, said that in water-borne salt-treated lumber, nails rust about the same but not more than in lumber of other treatments. If zinc-treated nails are used, there is no perceptible rusting. Also, there is no apparent rusting of such nails with the creosote treatment.

Mr. Barnhart asked about the effect of salt-brine drippings on hardware in creosoted and in untreated lumber, to which President Martens replied by saying that he knew the exposed parts of the hardware were affected but he could not advise on the unexposed parts. R. D. Hellweg (G. M. & O.) stated that he protects the exposed parts of hardware from brine drippings by coating them with roofing pitch. L. H. White (I.C.) said that he uses a protective coating of petroleum products or plastic cement in many instances, which has proved effective when applied cold to the tops of bolts. He warned, however, that these protective coatings were ineffective when applied after the rust has become well established, and likened the coating to the application of similar coatings on the underparts of new automobiles. A member of the reporting committee, R. R. Clegg (Amer. Lumber & Treating Co.) stated that if the members were further interested in the corrosion of hardware in treated woods, an extensive report on this subject had been prepared by one of the committees of the American Wood Preservers' Association.

Strength in Bending Corrected to 12 Per Cent Moisture Content

Specimen No.		Stress at Proportional Limit	Modulus of Rupture	Modulus of Elasticity
			(lb. per sq. in.)	
Log 1, piece 1	Salt Treated	5,940	8,510	1,664,000
	Untreated	7,600	9,770	1,817,000
Log 1, piece 2	Salt Treated	6,650	8,700	1,540,000
	Untreated	6,740	10,100	1,652,000
Log 2, piece 1	Salt Treated	7,820	10,090	2,262,000
	Untreated	7,400	8,790	1,923,000
Log 3, piece 1	Salt Treated	7,950	11,460	2,336,000
	Untreated	9,960	11,980	2,585,000
Log 5, piece 1	Salt Treated	8,200	8,950	1,952,000
	Untreated	6,790	10,560	1,760,000
Average	Salt Treated	7,310	9,542	1,951,000
	Untreated	7,698	10,240	1,947,000

External Protection From Corrosion for Pipe Lines

Report of Committee*

• The amount of damage done each year to water, gas and oil lines by corrosion has been a matter of much concern for quite some time. Accurate estimates of the loss resulting from corrosion and the cost to the railroads each year are not possible, but there is no question that this sum is very large. Costly replacements of pipe, both overhead and underground, are mostly due to the effects of corrosion. Losses of the fluid through leaks caused by corrosion may amount to another sizeable sum. Increased maintenance costs and greater out-of-service time are other effects of damage caused by corrosion. This is especially true of pipe lines under several feet of cover or in inaccessible places. While not all of these losses can be prevented, they can be reduced considerably by one or more of the main techniques used for controlling the rate of corrosion, namely, protective coatings, alloying, cathodic protection or change of environment.

This report is intended to serve as a guide only for the external protection of iron and steel pipe, since these metals are most generally used for piping systems and are subject to the major portion of the corrosion that takes place.

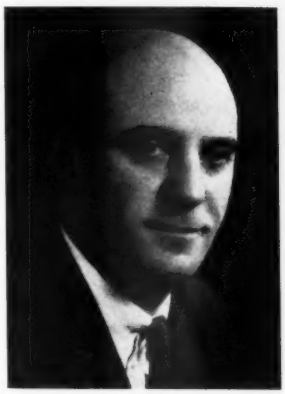
The conditions which bring about the deterioration of the iron and steel pipes are entirely different underground than when exposed to the atmosphere. For this reason, the prevention of underground corrosion and atmospheric corrosion will be discussed separately.

Corrosion of pipes is simply an electrochemical reaction by nature in an attempt to revert the iron back to its original form as an ore. By fully understanding the basic principles of corrosion and by making use of the most effective methods of reducing the rate of corrosion, large sums of money can be saved annually.

Atmospheric Corrosion

Corrosion of pipes exposed to the atmosphere is influenced by the length of time the pipes remain wet, by the extent and kind of atmospheric pollution, by the presence of condensed moisture in the rust film and by the composition of the metal. Protective coatings have been developed to the extent that they may be the most economical method of controlling corrosion.

*Chairman of this committee was H. E. Graham, assistant superintendent water service, Illinois Central, Chicago; vice-chairman was H. W. Routenberg, master carpenter, Baltimore & Ohio, Baltimore, Md.



H. E. Graham
Chairman

Paints are effective against atmospheric corrosion in that they isolate the metal from moisture and oxygen in the corroding environment. Paints generally used on piping that is subjected to moist atmosphere usually are of the asphaltic or bituminous type— applied over a suitable primer. Red lead, when used as a primer, not only protects the metal by shielding it from the environment but also because of its inhibitive action. Aluminum paint or black graphite may be used for finishing coats over a rust-inhibiting primer.

Paint should be applied only to a clean and perfectly dry surface, as the life of the paint film bears a direct relation to the condition of the surface of the pipe at the time it was applied.

Where severely corrosive conditions exist around air lines, sprinkling systems, water or gas lines, the petroleum base coatings containing a chromate rust inhibitor have proved very effective. This type of coating is usually protected with a spirally-applied reinforced fabric wrapper in direct contact with the undercoating. A service coat consisting of a combined petroleum and resin base material is applied over the wrapper for the purpose of sealing the seams against moisture penetration. All of these coats may be applied the same day, as no drying time is required.

Of the various metallic coatings that may be applied to pipe, galvanizing is the most common. Hot-dip galvanizing applied to steel and iron pipes usually provides satisfactory protection against atmospheric corrosion. It must be remembered, however, that under severe corrosive conditions, zinc, being anodic to iron, will corrode at a faster rate than iron, and too long a life should not be expected. This is especially true in an atmosphere containing sulfur dioxide. Under less severe conditions, zinc compounds are formed giving a natural protective coating and adding much to the life of the steel.

Under atmospheric conditions, the addition of a small amount of copper in steel has a marked effect in giving greater durability to this metal. This greater resistance to corrosion is due to the dense rust coating or film formed on its surface. Alloys containing a high percentage of chromium or chromium and nickel combined are highly resistant to corrosion but due to their high cost are only used in special work.

Underground Corrosion

There are many factors entering into soil corrosion, and for this reason any previous experience with the corrosive conditions of the soil is most valuable. There is also a wide variation in the rate of corrosion in different soils. Cinder fills contribute much to accelerate corrosion. The corrosive character of a soil depends mainly upon the soil water and its dissolved solids and gases, the dissolved solids being acids, bases, salts and organic compounds; the dissolved gases will consist of oxygen, carbon dioxide, hydrogen sulphide and sulfur dioxide in varying amounts.

Sand cast pipe has a natural protective iron silicate surface coating, fused on to the metal when the iron is cast. The rapid chilling given centrifugally cast pipe also tends to give the metal greater surface resistance. When the corrosion of cast iron is severe it undergoes a process known as graphitization. The corrosion follows the graphite flakes and the iron retains its original form, but it is soft and has little strength, while in iron and steel the corrosion occurs only on the surface.

When soil is in contact with dissimilar metals of a buried pipe system, severe, local bi-metallic corrosion often results and the pipe may fail with unexpected rapidity. Bimetallic corrosion can be reduced to a minimum by using the same metal throughout the entire piping system. The depth to which bimetallic corrosion penetrates is directly proportional to the ratio of the area of the less noble metal to that of the anodic metal exposed to the electrolyte. In the case of brass valves with iron and steel pipe, or brass-trimmed iron and steel valves, the effect of a small area of

D. T. Rintoul, general bridge inspector, S. P.; J. W. Carter, bridge and building supervisor, Virginian; G. S. Crites, division engineer (retired) B. & O.

brass is distributed over a relatively large area of ferrous metal, and under most conditions does not cause serious corrosion.

Stray electric direct current often causes severe local corrosion in underground pipe systems. Usually this stray current is the result of defective ground or bonding in a near-by direct current circuit, which should be corrected. Protective coatings cannot be depended on for the prevention of stray-current electrolysis. Any failure in the coating on a pipe that is anodic, will concentrate the flow of current to a small area on the pipe, which increases the rate of penetration at this point.

The extreme variation in the corrosive conditions encountered around railroad terminals and shops results in a wide range in the life of iron and steel pipe. These pipe lines, which are usually comparatively short, require materials and methods of protection particularly suitable for this type of work. Elaborate equipment for applying special protective coatings cannot normally be justified.

Piping is most easily and economically protected at the time it is installed. Steps should be taken at this time to improve the environment and to apply the protective coatings. Ground water is necessary for corrosion to take place in soil, and anything that can be done to improve drainage will reduce the rate of corrosion. Drainage may be improved by a bedding and backfilling of sand, gravel or crushed limestone. Limestone has an additional advantage by raising the pH value of the ground water in contact with the pipe. Clay also affords protection, but cannot be relied upon in a corrosive soil where the drainage is poor.

As in atmospheric corrosion, galvanizing has been the most generally used metallic coating for the protection of underground pipe, but only to a limited extent. The zinc coating will provide protection in only slightly corrosive soils. The threaded joints of the pipe must receive special attention.

A non-metallic protective coating should provide waterproofing and shielding from soil stress, as well as electrical insulation. The linseed oil paints are not generally used underground and should not be relied upon for permanent protection.

Asphaltic or bituminous coatings applied hot are widely used for coating of pipes to be used underground. No additional coating is normally applied to cast iron pipe, while steel pipe should have the additional protection of a spirally-wrapped fabric saturated with a bituminous material—if the soil conditions warrant. The fabric helps to prevent injury to the protective coating caused by soil stress or abrasion. In applying asphaltic bituminous castings it is important that the steel or cast iron pipe be free of all loose mill scale, and the pipe thoroughly clean and dry.

The reinforced petroleum-base rust-inhibitive coatings have proved as effective in the prevention of corrosion of steel pipe underground as when exposed to the atmosphere. This type of coating has the advantage of being applied cold and by hand.

Probably the most permanent coating for underground protection is portland cement concrete which forms a film of alkaline solution in contact with the iron to inhibit corrosion. Concrete coatings are very durable and may be applied on a wet surface.

Cathodic protection of underground pipe systems is used to reduce corrosion of uncoated pipes and to insure continued protection with the coatings now available, since most all coatings will deteriorate or become damaged in time. Any break in the protective coating will tend to concentrate the corrosion activity to that point causing rapid failure.

To apply cathodic protection, auxiliary anodes are buried at suitable distances from the pipe line, through which a direct current is introduced into the soil. This current must be of sufficient magnitude to counteract any corrosion currents. The protective current may be obtained from a direct-current generator or rectifier or by the use of galvanic anodes of magnesium, aluminum, or zinc. All types of the above anodes will be corroded in the process of protecting the pipe line and must be renewed at regular intervals. Where cathodic protection is applied to a new pipe line, it should be used in combination with a protective coating in order to reduce the current density requirements. On existing pipe systems which were not coated when installed, safe cathodic protection can be provided with higher values of current density.

Finally, it must be remembered that not all losses due to corrosion can be economically prevented. The choice of the method of corrosion control used, then, is dependent upon the required service life of the pipe, the life of unprotected pipe as compared with the increased life due to the protection, the cost of the protection, and the cost of renewing the pipe line. No one type of protection is suitable for all conditons; therefore, the factors controlling the corrosion must be studied carefully.

Discussion

W. E. Wilson (Int. Ry. of Cent. Amer.) opened the discussion by citing an example of how the Standard Oil Company prevents corrosion of pipe lines supported on buoys and extending out into the sea off Salvador. This is done by suspending a rod of magnesium under each buoy.

G. Martin (I.C.) pointed to that part of the committee report which states that protective coatings should be applied to a dry surface on the pipe. He advised that it was quite easy to misjudge the dryness of metal, especially a pipe carrying cold water and when the atmosphere is warm. If paint is applied over damp metal, corrosion may be accelerated by the coating. It may be more economical, he said, to let a pipe that has long durability go unprotected and replace it when necessary than to try to protect it.

C. A. Smith (I.H.B.) cited an instance where he installed about 3,000 ft. of air line of extra-heavy metal pipe. Desiring a long service life from this pipe line, he was careful in protecting it with a spirally-wrapped fabric saturated with a bituminous material. Also, the pipe was laid in a bed of sand. Within 11 months the air compressor was found to be overworking and when the line was uncovered it was found to have failed due to electrolysis. An electrician was present and tested the line for electrical currents, finding one volt. The entire line must now be renewed and will be given cathodic protection.

Precast Concrete Piles in Bridge and Pier Construction

Report of Committee*

• The use of concrete piles at any site warrants a thorough survey on and below the surface. Borings should be made at frequent intervals to determine the lengths of the piles that are to be used. Under favorable conditions for boring, and where irregular formations of rock exist, some roads have found it economical to bore or sound each bent or pier location before the piles are cast. At the present per-foot cost of concrete piles, large savings may be effected by determining the proper length of all piles before casting any of them.

Location of the Pile Yard

The pile yard, or point where piles, slabs, and other concrete items are made, should be located where there is good drainage, solid ground for footings, proper topography for sufficient tracks and driveways, ample space for unloading and storing aggregates, cement, and steel, and space for storage for seasoning of the various items proposed to be made at the plant. Proximity to sources of supply for aggregates and cement, as well as the most favorable location for distribution of the finished product to the points of use, must also be considered in order to minimize unnecessary transportation. Like any other manufacturing enterprise, the proper selection of a plant location will have a direct bearing on the cost of the finished product.

Types of forms may vary widely, depending on the number of units to be made and whether the project is to be of short duration or a permanent set-up. Generally, the more carefully the forms are made, the lower the final cost will be if any reasonable number of units are to be made. Forms must be made so as to support the piles being cast without settlement and deflection so as to allow easy and rapid placement of reinforcing and concrete and proper vibration of the concrete. The forms should be made so as to be easily assembled and disassembled for rapid handling. Most experience has indicated the superiority of steel forms for precast concrete items. These forms, in any event, should be simple, sturdy, properly made, and supported. For a permanent set-up, a concrete-paved casting yard will prove to be a good investment.

J. F. Warrenfells, Jr.
Chairman

The number of forms required will be determined by the output desired from the plant, but a sufficient number must always be available so that production will not be halted while previously cast units are still green and the forms are not removed and available for the next pour. The number of forms for a permanent set-up will vary from the number required for a portable set-up where piles are cast on the job site.

Holding the Reinforcing

There are many methods of holding reinforcing for piles—in fact, about as many as there are people designing concrete piles and in general, they are all governed by the same rules. The steel must be held securely so that it will not be moved when the concrete is poured; and it must be in proper place after the concrete is poured. Generally, the devices for holding reinforcing fall into three classes—hooks, stools, and spacers, any of which will do the job required of them. Specifications of the American Railway Engineering Association cover the fastening and holding of reinforcing steel, and any method satisfactory under these specifications will give good results. The use of pieces of concrete, brick, or wood to hold reinforcing should not be permitted under any condition.

Pouring the Piles

In pouring piles it is of the utmost importance that the top end of the piles be cast exactly at 90 deg. to the axis of the piles to prevent chipping and breakage of heads during driving. It is also necessary that the piles be cast straight, since a slight deviation therefrom makes it extremely difficult to plumb the piles properly when the driving is begun.

Concrete mixes should be designed to attain the highest practicable strength, as determined by the ability to place the mix in forms, using vibrators. A minimum 28-day strength of 5,500 to 6,000 psi. should be attained. Some roads aim for as little as 3,500 psi., but the consensus of opinion holds to the higher strength.

As soon as the piles have taken the initial set, they should be covered so that there will be no drying out of the concrete. They should be kept covered for a suitable period, and sprinkled with water if the weather is such that there is a tendency for the concrete to dry out. Under no circumstances should the pile be allowed to cure without taking measures to control this phase of its manufacture. Piles that have cracks may well be the weakest spot in the bridge. This is especially true in those regions where there is salt water that might penetrate far enough to rust the reinforcing.

Whether the piles are cast on the job or at a central location, the rules for storing are the same. Piles should be handled and placed so as to avoid injury or overstress. If sufficient space and supports are available, the pile should not be stacked. But if it is necessary to stack them, they must be supported at the design support points, on firm an adequate bearings, and subsequent layers must be separated so as to avoid bending in either layer of the piles. The wood strips should be thick enough to insure sufficient clearance for placing slings.

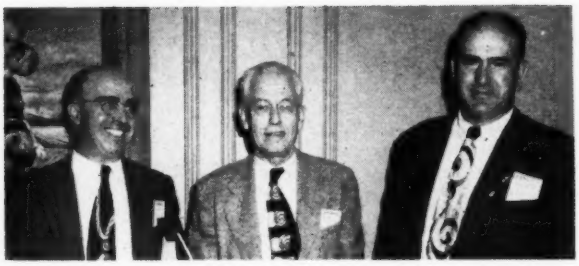
If practical, piles should be distributed to their proper bent locations when they are unloaded, or stored. This, of course, is dependent upon conditions at the job site.

Loading Piles for Shipping

Concrete piles which must be shipped to another location must be handled with the greatest of care; piles may be loaded on flat cars or in gondola cars, but in either case, they must be securely blocked to avoid shifting in any direction while enroute. Hardwood blocking is preferable. AAR loading rules must be complied

*Chairman of this committee was J. F. Warrenfells, Jr., master carpenter, Seaboard Air Line, Savannah, Ga.; vice-chairmen were A. S. Krefting, principal assistant engineer, Minneapolis, St. Paul & Saulte Ste. Marie, Minneapolis, Minn., and J. R. Showalter, bridge engineer, Missouri Pacific, St. Louis, Mo.

J. R. Showalter, bridge engineer; S. R. Thurman, bridge and building supervisor; B. A. Hynum, roadmaster—all M. P.



J. A. Jorlett, assistant engineer, P. R. R.; A. E. Bechtelheimer, engineer of bridges (retired), C. & N. W.; F. R. Spofford, assistant division engineer, B. & M.

with to avoid damage to the piles and to other traffic. Piles should be loaded so as to facilitate the unloading, since in most cases railroad materials are handled with work trains, the cost of which is not negligible. Pick-up points should be plainly marked before the piles are loaded. Cars should be carefully inspected before piles are loaded in them. The weight of the pile can crush the blocking into the car decking badly enough to make it almost impossible to place unloading slings. When this happens, all adjacent piles should be moved and the pile should be rolled onto thicker blocking with jacks or bars, working only at the pick-up points.

Driving the Piles

In driving concrete piles, the right equipment is the most economical equipment. The hammer should be big enough to overcome the inertia of the pile and yet not so big as to damage the pile under hard driving conditions. A set of leads will do much to expedite the driving, especially when the hammer is first set on the pile. It is much easier to plumb the hammer, and to keep it plumb, with leads. It is necessary to keep the hammer in accurate alinement with the axis of the pile to avoid spalling or splitting of the pile heads, especially during hard driving. A laminated timber cushion block must be used between the striking head and the top of the concrete pile, but this does not eliminate the necessity of keeping the hammer alined with the pile.

Any necessary excavation should be done ahead of the driving for economy's sake as well as to feel out and remove any obstacles in the way that might damage the concrete pile. Under favorable conditions a water jet may be used to open a hole ahead of the driving. If frames are to be used to hold the piles, they will serve as a guide for the jet pipe, which will eliminate the possibility of the piles running off when they are set.

In most cases, frames or templets for holding the piles in a vertical position are practical. This is especially true where one machine is used for the driving and setting. The weight of the hammer, plus the weight of a pile, is usually too much load for a machine, which makes it necessary to set the hammer down while setting the pile. If repeated for each pile, this operation would be very expensive. Consequently, if frames are set, several piles may be set up for driving—the number depending on local train movements. Frames set at rail elevation and at the ground line will suffice. Where a three-pile bent is used, the timber chord of the old trestle may be lined up to serve as a frame for the center pile.

A jet of air, or water, may be used to control the direction of the pile while driving. The main objection to using a jet is the problem of handling it. It usually requires an unwieldly length of pipe for which provision for handling must be made.

Care must be taken at all times to avoid damage to the piles while driving. Solid foundations should be carefully located and care taken to avoid striking the pile after the foundation is reached.

Cutting Piles for Capping

Where piles cannot be driven to full depth, without excessive cost, and the penetration is satisfactory, some device for cutting off the pile must be employed, although this can best avoided by determining the proper length pile for the job at hand. There are various methods in use for cutting off and stripping concrete piles, but the most popular seems to be the use of air tools. The air-operated "paving breaker" is a favorite for this work. Blasting is used only to a limited extent as it requires some skill. This, of course, requires the use of a drill for setting the charge. If the reinforcing steel is properly situated, a drill may be also used and the pile head snapped off with the pile line on the driver after the bars have been exposed and burned off. To avoid spalling of the concrete, a steel band can be made to fit the shape of the pile, with the top edge of the band placed at the point of cut-off. A small air-operated chipping hammer may be used to groove the pile at the cut-off point. This, too, will eliminate spalling to a large extent.

Probably the most important consideration is the economy in the proper use of the concrete pile. The concrete-pile structure is just coming to the front in many parts of the country, although its use dates back many years. The objections of the past are fast being overcome, principally the lack of equipment to handle the loads involved, since such equipment is restricted to this application. However, the rising cost of timber structures has placed the concrete pile in a more favorable position from a cost standpoint than ever before.

Discussion

G. S. Crites (B. &. O., retired) agreed with the report that predetermining the lengths of concrete piles is necessary but he wondered how this could be done. Chairman Warrenfells stated that he uses a machine, which is a combination of an auger and a sounding rod, for this work. He said that while the machine requires about three or four men to load and unload, it can be operated by two men. In using this machine, he bores the holes at random, but he understands that some roads make soundings for each bent.

A. B. Wang (C.I. & L.) stated that he uses a commercial dry-sampling sounding method and makes a sounding for each bent. A. E. Bechtelheimer (C. & N.W., retired) said his road uses core borings to determine the nature of soil material. Since it is desired to have the piling project 25 ft. below the stream bed, he said, the borings are carried at least to that depth unless the soil conditions indicate the need for deeper borings

to secure a more substantial bearing. The concrete piles are then ordered to the proper length to avoid cutting.

H. A. Matthews (St. L. -S. F.) asked how much pressure should be used when jetting through quicksand. He had been using 150 p. s. i. reduced to ¾ in. Chairman Warrenfells said he used 350 p. s. i. reduced to ¾ in. and President Martens said he never used less than 350 p. s. i. The suggestion was made by T. M. von Sprecken (Sou.) that quicksand may require a larger jet pipe.

J. R. Showalter (M.P.) stated that he used a 2-in. auger for boring down 30 or 40 ft. but the method was not satisfactory for developing the desired information. He then tried a plan of stockpiling about 300 concrete piles ranging in length from 25 to 60 ft. Based on past experience obtained when driving timber piles at a bridge site, and the nature of the soil, he would estimate the pile lengths for a bridge and ship a carload of concrete piles, usually 2 piles each of 3 different lengths, which were driven as test piles. If the test piles proved to be of the wrong length, the proper length piles can be ordered and the foreman and his crew can work at other things until the new piles are delivered. Mr. Showalter expressed the belief that only by driving test piles can the proper lengths be determined to suit both soil and driving conditions.

How to Sell Accident Prevention to the Man in the Gang

Report of Committee*

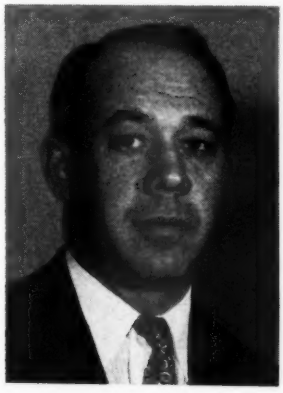
• The attention of industrial management is being focused more than ever before on accident prevention and its relationship to personnel and production. Accidents, whether they occur on or off the job, represent an important cause for lost time, and seriously interfere with production schedules. They cause a great deal of sorrow and suffering to the individual and his family. As a result many organizations have greatly intensified their safety programs in order to combat accidents.

It is an accepted fact that many accidents are the result of unsafe practices or unsafe conditions or a combination of both. Unsafe practices which are much more difficult to correct than unsafe conditions are unfortunately the cause of the greater proportion of accidents. Management has the basic responsibility of providing safe working conditions. It also must provide the means for a well-developed training program to educate supervision and employees in the correction of unsafe practices.

The railroads of our country were among the first to recognize these safety principles and their application to railroad operation. The vast improvements that have been made to the railroad plants through the years both for employee and public safety comprise a monument to this cause. Every railroad employee should be proud of this development in his industry and should wholeheartedly support the accident-prevention program of his railroad.

Some Basic Facts

In order that everyone in the bridge, building and water service departments will become thoroughly sold on the safety program, there are some basic facts to be observed:



E. H. Blewer
Chairman

1. There must be a thorough and and complete educational program in order to bring the hazards of the job to everyone's attention and to emphasize the corrective measures to be applied.
2. All the supervision must be entirely in accord with this program and *believe* in its application. (Note: Supervision includes every person who serves in a supervisory capacity from the president of the company down through the foremen and gang leader.)
3. The attitude of "new men" and "old timers" must be right for their participation in safety work.

In order to have a thorough and complete educational program there are many subjects involved. There is no way for you or me to point definitely at anyone and say, "We have saved this man's life or prevented him from sustaining a personal injury," though you probably all know of a certain isolated case. Statistics are used as the measuring stick for safety programs. You have all seen production schedules. Safety statistics are in the same category. They measure each department's, supervisor's and foreman's ability in safety work. They show where the good and bad spots are, and where the most attention should be concentrated.

Thorough Records Needed

The keeping of records showing the causes of accidents in all departments should be very thorough. These are necessary in order to point out to supervision what to look for and the remedies to be applied. Safety rule books are made up from these accident causes. Causes and remedies are the basic educational part of any safety program and should be thoroughly taught to all supervision. You may liken this to an apprenticeship served in any trade. There are various means of getting these points across, such as:

Safety meetings with supervision—and they in turn with their men.

Personal contact by safety agents with the men.

Films—motion and sound-slide training films showing the correct procedures for the work.

Actual demonstration in work methods.

Safety literature, graphs, posters, home-made demonstrations.

Some railroads have home safety committees and family night safety rallies working toward establishing the basic principle of safety in each home.

With a thorough educational program in motion step No. 2 is reached—the training of the supervision and the application of these safety principles. By holding safety meetings with the supervision, the safety man is able to teach the

*The chairman of this committee was E. H. Blewer, assistant superintendent of safety, New York Central System, New York: vice-chairmen were H. M. Dick, master carpenter, Pennsylvania, Harrisburg, Pa., and N. R. Tucker, assistant division engineer, Texas & New Orleans, Lafayette, La.

E. H. Blewer, assistant superintendent of safety, N. Y. C.; H. M. Dick, master carpenter, P. R. R.; W. A. Huckstep, general building supervisor, M. P.

L. A. Luther, Ingersoll-Rand Co., J. E. Lockhart, division engineer, N. W. P., D. T. Rintoul, general bridge inspector, S. P.

causes of accidents and the remedies to be applied; but first it is necessary for all supervision from top to bottom to be "sold" on safety work. A supervisor, besides being a leader, must be a humanitarian. He must be fair and firm in his decisions, never showing any partiality. Men will generally "follow the leader" and work as he wants them to. A supervisor, when he is planning his work, should build safe work habits into the job. It is important that this be done and that everyone should know the correct procedure. You may always select the best of materials for your job, but have you considered that the workman is the most important of all these materials? With safe and efficient workmen you are assured of a good job, while the inefficient and unsafe worker is certain to cause untold delays and accidents.

The president of one of our large shipbuilding concerns made the statement that "a ship would never be perfect no matter how beautiful it looked or performed unless it was built without personal injury to any man who helped in its construction." We can all apply this to our own job because a good supervisor will plan the details of his work with complete thoroughness. He will be able to visualize the job step by step from the beginning to its conclusion. When such planning is done and the safe work habits are included in this planning then we are getting very close to a perfect job.

The responsibility for a perfect job rests with the supervisor and his ability to teach men the correct procedures in their work. His alertness is ferreting out unsafe practices and correcting them before an injury occurs is as much a part of his work as getting the work completed. There are many aids (previously mentioned) that are helpful to the supervisor in the training of his men. With a sound and proper program and his knowledge of accident prevention the supervisor is now ready to tackle the job of selling the man in the gang on safe work habits.

We railroaders have a tendency to class men as "new men" and "old timers." We draw a distinct line between them but we wonder, so far as accident prevention is concerned, if that is not a mistake. We all know of injury cases where "old timers" who have had many years of service have been seriously injured or killed. Can we say that a new man is more likely to sustain an accident than the "old timer"? The only difference, from a safety standpoint, is that the new man with the right kind of supervision can be developed into a safe workman. Many an "old timer" is handicapped by bad work habits acquired over a period of years. These are very difficult to correct because of long usage. From the safety viewpoint we cannot make a distinction between a "new man" and an "old timer." Both must learn and practice safe work habits. Every man in a gang is an individual — his thoughts, habits, knowledge, skill and attitude differ from those of his fellow employees. It is necessary for the foreman to understand these traits and know the methods of dealing with them. Often one method, while fine for one man, is a failure with another.

The proper time to stress safe work methods to a man entering the service is when he is first employed. He must be told about the safety program and its relation to him; what the company is doing in safety work and how he is expected to become a part of this program. Of course, you cannot expect him to learn everything with one good five-minute talk. He must be coached and brought along just as a football coach brings his team forward.

Teamwork Important

He must be taught teamwork and its importance in safe work methods. He must be taught the hazards of the job and the precautions to be taken to avoid a personal injury. He must be given safety assignments to perform just as any other work, and in this way he will acquire a sense of responsibility in safety work. The foreman should watch for any unsafe practices, and explain the safe method to be followed. The worker's ideas should be evaluated in order to make him feel that he is important. When safety meetings are held the supervision should attend. If they do not the worker is justified in thinking that his presence is not required. What is important to one man is important to another.

An attitude of complete sincerity on the part of the supervisor or foreman in safety work is essential at all times. In other words, he cannot practice safety only when it suits his convenience; it breaks down a man's morale and lessens his respect for his superiors. When a man has formed unsafe work habits through long usage he can be corrected by persuasion and persistence on the part of the foreman. If a foreman will watch him performing his duties and make on-the-spot corrections of unsafe acts with an explanation of the safe method he will gradually bring the man around to safe work habits. That is a job of teaching and is worth every foreman's or supervisor's effort. A safe worker is an efficient worker and is the result of the training received from his supervisor. While we all cannot be experts in training, we can follow the basic steps which are:

1. Tell him how to do the job.
2. Show him how to do the job.
3. Watch him doing the job and correct if necessary.

By following these step a foreman can teach a man to be a safe and efficient worker. He will be well rewarded for all his efforts by having a well-rounded gang. They will be loyal and cooperative. They will respect and trust his judgment. In short, they will FOLLOW THE LEADER.

Discussion

G. Martin (I. C.) stated that it is alright to teach a man how to do a job, but unless the man thinks of what he is doing, much of the teaching is nullified. He cited several examples of how thoughtlessness resulted in serious accidents. E. H. Barnhart (B. & O.) agreed with Mr. Martin adding that it is the little things that cause acci-

dents. Mr. Barnhart read a short article entitled Common Sense in Safety, which emphasized that each man must look out for himself.

G. S. Crites (B. & O., retired) said that, at the beginning of the safety movement on the railroads, the bulk of the safety suggestions that were submitted by the men called for changes in physical conditions, rather than the development of a more safety-conscious attitude on the part of employees. He recalled one instance where he objected to a suggestion that a sign be posted on a station platform to inform the public that trains might approach from either direction. He was over-ruled and the sign was made and erected, but he never saw anyone pause to read it.

J. B. Kelly (Soo Line) said his records showed that accidents on his road had been reduced 60 per cent in the last five years by all departments except the B. & B. and the signal departments. He referred to a recent accident among his B. & B. forces where a painter used a bar to pry up a loose plank. When the plank fastening suddenly gave way, relieving the strain on the bar, the painter caught his feet on the rail and fell into a hopper. He said that perhaps the supervisors of track may be able to teach the supervisors of B. & B. and signals something about safety.

W. A. Huckstep (M. P.) observed that many signs and posters have been erected in the name of safety and remain in place without change. If the signs are re-worded, mounted in a new place, or even repainted, he thought that more people would read them. J. A. Jorlett (Penna.) agreed with this observation and said his road has an illuminated sign that has a new slogan every year. Chairman Blewer agreed with what was said about signs. He is a great proponent of posters and believes that they should be placed on bunk cars and even on tool boxes. Permanent signs, he said, should be kept freshly painted, and posters should be replaced frequently with newer ones.

E. L. Collette, Sr. (St. L.-S. F.) said that accident prevention begins at home. Chairman Blewer agreed to this and stated that his road, the New York Central, had printed a booklet containing over 6,000 pointers on home safety. He also believes that each man in a crew or gang should have a day when he should look for unsafe practices and call them to the attention of others. This way, he said, every man can actively participate in the safety program. He also pointed out that, when a man is hurt at home, his whole gang is hurt because a new substitute worker must be broken in. If safety in the home is put across to a workman, he is going to be more safety-minded on his job.

Mr. Huckstep cited an instance where an employee had an argument with his wife before leaving home. Because his mind was not on his work, his hand came in contact with the moving parts of a machine, causing him to lose his fingers. Chairman Blewer said that one of the pointers listed in the N. Y. C. booklet on home safety was to the effect that a man should leave his home in a good frame of mind. He then cited an instance where a man was killed because he became careless while thinking of his wife's death which occurred exactly one year to the day of his own death. He didn't have his mind on his work.

Construction and Maintenance of Low-Level Passenger Platforms

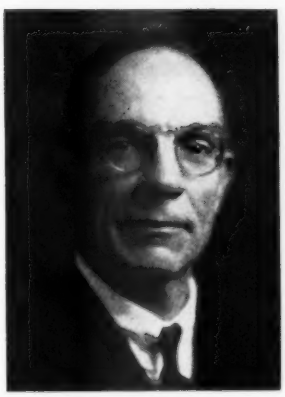
Report of Committee*

• There is no portion of a railway property that is more in the public eye than the passenger platform. It is used by all patrons using train service and is subject to close scrutiny while such people are waiting for trains. A clean and well-maintained platform cannot fail to make a lasting impression upon the traveling public; and it has a certain advertising value which should not be overlooked.

Kinds of Platforms

There are various kinds of wearing surfaces for platforms which may be considered, such as wood, screenings, brick, concrete, or various asphaltic compounds. The selection for any particular location depends upon the kind and volume of traffic, importance of the station for passenger traffic, climatic conditions, permanence, availability of materials, and cost.

In the northern climates, platform surfaces become slippery in freezing weather, and those with a smooth, hard surface are affected more readily than others. On the other hand, platforms with smooth, hard surfaces are better for trucking baggage, mail, and express; and they are more easily cleaned of snow and ice. Platforms constructed of wood or screenings, are much more difficult for trucking, and are usually not as clean, nor as even as the hard-surfaced type.



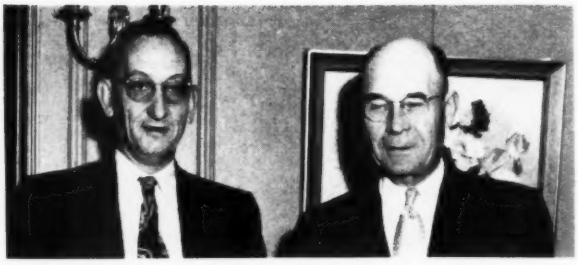
L. C. Winkelhaus
Chairman

The distance from center line of track to platform edge, or curb, varies with the particular railroad involved, and also with the clearance requirements of the various state codes. Many railroads have standardized on a distance of 5 ft. 6 in. from the center line of track to platform edge; and on a distance of 8 in. from top of rail to top of platform. Other railroads have standardized on a distance of 4 ft. 6 in. from the center line of track to platform edge, and 4 in. from the top of rail to top of platform; and some railroads construct platforms level with top of rail. Whatever the standard may be on the various railroads, the clearance must comply with the clearance code of the state in which the structure is located.

The width of platform for most wayside stations is usually 12 ft., except immediately in front of the station building, which is ordinarily set back several feet. This setback varies considerably on different railroads.

*Chairman of this committee was L. C. Winkelhaus, architectural engineer, Chicago & North Western, Chicago; vice-chairmen were H. T. Lord, bridge and building master, Canadian Pacific, Kenora, Ont., Can., and Eldee Park, Jr., draftsman, Missouri Pacific, Houston, Tex.

J. S. Hancock, bridge engineer, D. T. & I.; E. H. Barnhart, division engineer, B. & O.



W. M. Ludolph, assistant engineer; V. E. Engman, chief carpenter—both C. M. St. P. & P.

Careful consideration should be given to drainage of station platforms. Where possible, the slope for drainage should be away from the track. Where the slope is towards the track, suitable drainage should be provided.

Wood Platforms

In the original construction of the smaller stations, wood platforms were almost universally provided, and many of these platforms are still in use. Such platforms were usually 10 ft. to 12 ft. wide, extending in each direction from the station building, and a similar width at each end of the building.

Wooden platforms are usually constructed with the joists running parallel to the track, and with the planking placed at right angles to the track. The sills, on which the joists rest, should be supported on pile stubs, or mud plank.

It is considered more economical to use 2-in. plank and to design the substructure accordingly, using a live load of not less than 200 lbs. per sq. ft. for figuring timber sizes. The plank may be 8 or 10 in. wide and laid with a small space between adjacent plank. Joists, caps, or sills, should be of treated material, and of such size and spacing as determined by the design.

Maintenance on wood platforms is heavy. The planking soon shows wear from trucking and other traffic; some planks are broken, or splintered, and when these are replaced with new material, the surface of the platform becomes uneven, often presenting stumbling blocks for passengers. This type of platform also creates a serious fire hazard.

The cost of wood platforms does not compare favorably with the more permanent kinds of platforms due to the high cost of lumber and the great amount of labor required for such construction.

Platforms of Screenings

In many instances, where wooden platforms have worn out and required replacement, the practice has been to remove the platform entirely and place filling material with a topping of cinders, gravel, stone screenings, chats, or other suitable material.

The procedure is to place timber curbs, preferably creosoted material. Curbs should be at least 4 in. thick, with the bottom placed level with top of tie, and the top at such level above top of rail to meet the standard of the particular railroad involved. Curbs should rest on pile stubs, cedar posts, or a substantial mud sill.

In the construction of such platforms, it is desirable to provide tie rods to hold the curbs in line, and such tie rods should be spaced approximately on 6-ft. centers. Tie rods are usually threaded at both ends and are furnished with steel plates and nuts; they are at least ¾ in. in diameter, and the steel plates are about 6 in. by 6 in. by ⅜ in. Inasmuch as the tie rods are buried in the filling material, they should be galvanized or thoroughly coated with asphaltum, or wrapped with some asphaltic material in order to preserve them.

After curbs and tie rods are in place, filling material is placed. This may be crushed stone, gravel, cinders, or sand, or a combination of these materials. Filling material should be well soaked with water and thoroughly rolled, or tamped. The topping course of stone screenings, chats, or other suitable material is then applied in a course 6 in. or 8 in. thick.

Platforms of screenings are not the best that can be provided, but they are economical in initial cost. Bad spots will develop, due to a tendency to soften under wet-weather conditions. Trucking is much more difficult on such platforms, especially in the spring of the year due to weather conditions. They are objectionable because of the dirt that is tracked into the stations and coaches by the passengers; also, because of dust raised by wind and rapidly moving trains, which results in the station building becoming dirty.

Brick platforms were generally constructed at the larger stations, and where permanence was desired. These platforms have a number of advantages over other platforms inasmuch as they present a hard and comparatively smooth surface; they can be readily cleaned of snow and ice; if bricks are broken, or should settlement occur in spots, the brick can be taken up and relaid; if the grade is raised, and it becomes necessary to adjust the platform level, the brick can be salvaged and relaid.

Curbs for brick platforms may be of wood, cut stone, or concrete. Wood curbs are usually of creosoted material, 6 to 8 in. thick, and of a depth to suit elevation of top of platform with respect to top of rail. Anchor or tie rods should be provided in the same manner as for screenings platforms.

In former years, cut-stone slabs about 5 in. thick by 30 in. deep and 4 or 5 ft. long, were used for curbs for brick platforms. These slabs were set firmly in place and all back filling thoroughly tamped. These stone curbs gave good service and many are still in use. Some railroads use precast concrete slabs for curbs and these are set in the same manner as the stone slabs. Such slabs are usually 6 in. thick, 30 in. deep and 4 ft. or 5 ft. long.

At the present time, it is the practice to construct concrete curbs. The general design calls for a width of 5 or 6 in. at the platform level and 12 in. at the base; the track side of the curb being vertical and the rear side tapered particularly near the top so that any heaving of the bricks will exert less force on the curb. The bottoms of the concrete curbs should be at least 18 in. below the top of tie. They should be built in sections of about 6 ft. in length and expansion material placed between such sections. To provide for drainage, weep holes, about 2 in. in diameter and spaced on 4-ft. to 6-ft. centers, may be provided.

It is essential that brick platforms be constructed on a well-prepared base composed of crushed stone, gravel, cinders, or sand, or a combination of these materials. Such materials must be flooded with water and well tamped, or

rolled, in order to eliminate as much settlement as possible.

The preferred brick to use for station platforms is a vitrified shale brick about 3 in. thick, 8 in. long and 4 in. wide. Bricks are laid flat on a 1-in. sand cushion, with broken joints, and in straight lines across the platform at right angles to the curb. After the bricks are laid, the surface is thoroughly rolled with at least a 500-lb roller. Then, all joints are filled with screened mason sand, clean and dry, and, finally, a thin layer of sand is left over the entire surface of the platform, more or less of which will work into the joints. A well-laid brick platform will last many years, and will require very little maintenance.

Concrete Platforms

It is the present-day practice, where permanence is desired as well as appearance, to construct concrete platforms. Such platforms, when properly constructed on well-prepared base, give excellent service and present an attractive appearance.

The earlier concrete platforms were more or less of a failure, due primarily to improper concrete mixtures, lack of expansion joints, and not enough attention paid to preparing the base, including drainage for same. Some of the results of such construction were settlement and contingent cracking of concrete surface, causing unevenness in the platform and surface projections.

The preparation of a firm base for concrete platforms is more essential than for a brick platform. The same materials and procedure should be followed, but more attention given to the work. This feature cannot be stressed too highly.

It is preferable to construct curbs integral with the platform slab. The bottom of the curb should be about 18 in. below the top of tie, and the thickness should be approximately 6 in. at that point. The track side of the curb, of course, is constructed vertical, while the inner face slopes upward to the underside of the platform slab, where curb construction should be about 18 in. thick.

Concrete platform slabs are usually constructed at least 6 in. thick, and reinforced with welded wire mesh in 6-in squares and No. 9 wires in each direction. The reinforcing mesh is bent down into the curb construction, and it is desirable to provide additional reinforcing in the curb, using ½-in. bent bars on 12-in. centers along the outer face of the crub and extending into the slab a couple of feet.

Expansion joints must be provided at intervals of approximately 35 ft.; thus slabs can be constructed in alternate sections of this length. At these expansion joints, ¾-in dowels 2 ft. long, are provided on 24-in. centers; one end of each dowel is oiled and fitted into a metal expansion tube. A premoulded expansion joint filler is then used to fill the joint completely. Another method, to allow for expansion, is to dip one end of the dowels into hot asphalt and allow to cool before installation; or wrap one end of each dowel with asphalt felt.

Concrete-Brick Platforms

Brick platforms usually begin to show failure at the curbs and in the portion of the platform adjacent to the track. Some railroads have made repairs by removing the old curbs and a portion of the brick platform along the track, and reconstructing with a concrete curb built integral with a 3 or 4-ft. strip of concrete platform. This construction presents a pleasing appearance and also provides a definite line of demarkation for passengers and trucking operations.

Asphalt-Mastic Platforms

Occasionally, brick or concrete platforms are in such a condition that it becomes necessary to provide a new surface. There are a number of asphaltic compounds on the market that are suitable for such repair work. Such material is applied with a trowel and varies in thickness from ½ in. to ¾ in. No special preparation of the old platform is necessary and it can be placed with very little interference with station operations. There are no joints to contend with; hence, a very smooth and resilient platform surface is obtained.

It is recommended that the application of any asphaltic topping material should follow strictly the specifications of the manufacturer of the material.

Bituminous Concrete Platforms

Bituminous concrete platforms are being constructed quite extensively on the various railroads, particularly at the smaller wayside stations where the traffic is not too heavy. Such platforms are receiving favorable comment from the traveling public.

In practically all platforms of this type, the curbs are prepared as for screenings, brick, or concrete platforms. The platform area is then filled with crushed rock, or coarse gravel to within 2 in. of the finished surface. In some instances, bituminous concrete, composed of crushed rock, stone dust, and asphalt, is used for this base. At some locations, bituminous material is sloped to the ends of the ties without a curb.

After the base is placed and properly rolled, a 2-in. wearing surface of hot mixed asphalt mastic is placed. In lieu of hot mixed asphalt, a wearing surface of natural asphaltic rock, cold-mixed with a small amount of road oil, may be used. The finished surface is often dusted with Portland cement to produce a light color. It is reported that such a wearing surface does not soften in the summer time, and steel tired baggage trucks do not dent the surface.

One of the larger western railroads constructed asphalt mastic platforms in its trainshed more than 40 years ago. These platforms have required but little repairs, although subjected to heavy traffic, both pedestrian and trucking. While these platforms are more or less under cover, they have been exposed to all the weather elements, except direct rays of the sun.

Conclusion

In compiling the foregoing report, it has been the endeavor to describe the various types of platforms so that the designer of station facilities may have a selection to meet various conditions. Platforms are an essential part of passenger station facilities, and a well-constructed platform is an asset to any railroad.

Discussion

E. H. Barnhart (B. & O.) opened the discussion by saying that unless concrete curbs are sufficiently anchored, platform truck loads tend to push them toward the track. He found that curbs with a 12-in. top and a 24-in. depth gave better performance than those with a 5-in. top. John Ryden (G.C.L.) agreed that the precast curbs on his road, which were 6 in. wide at the top, 30 in. deep and extend 8 in. above top of rail, were inclined to be pushed toward the track, causing reduced clearances. In repairing them, he said, he takes out an old section of the curb and pours a new one in its place but with tie rods extending back from it. G. S. Crites (B. & O., retired) stated that curb slabs should be keyed together and mentioned a platform curbing poured in place, dowelled together, and with a step in the rear instead of a slope, which he installed in 1926. This curb is just as effective as when new, he said.

Mr. Crites deplored the use of stone screenings or cylinders as surfacing for platforms, saying that

no mechanical units can be used on them for cleaning off snow or dirt. He recommended a hard-surfaced platform. Mr. Barnhart said that a troweled asphalt-mastic surface ½ in. to ¾ in. thick applied in repairing concrete or brick platforms was too thin, his view being that the new surface should be 2 in. thick and then rolled.

President Martens related that a brick platform constructed at San Bernardino, Cal., had the sand particles removed from the joint interstices by ants and the only way he could cope with the activities of those insects was by placing a black-top surface, from ½ in. to 3 in. thick, and then rolling it. H. W. Routenberg (B. & O.) stated that brick had a bad characteristic when used on a sand cushion for platforms having a butterfly-type canopy with center columns. The trouble is that platform trucks generally follow the same path over these platforms, causing them to wear badly and get out of surface.

When W. A. Huckstep (M.P.) asked if anyone could suggest a better surface than concrete for platform trucking, Mr. Crites answered that concrete with a bituminous surface was the best for this purpose. Mr. Huckstep did not believe that a bituminous surface would be durable in the southern states, to which Mr. Crites agreed but suggested that substituting a tar for the bituminous surface would no doubt work out better in the warmer climates. President Martens stated that he found a hot-mix (plant-mixed) bituminous coating for brick platforms satisfactory even where warm temperatures prevail.

Installing and Maintaining Waterproofing On Ballast-Deck Bridges

Report of Committee*

F. J. A. Leinweber
Chairman

• Types of ballast-deck bridge floors that require waterproofing are usually of the steel deck or concrete type, the latter being most common. In order to prolong the service life of these structures, it is essential that the ballast floor be protected from water, brine, and other foreign agents that attack and hasten deterioration and disintegration of materials used in their construction.

Concrete is known to have a strong tendency to absorb water either by capillary attraction, by gravitation or by hydrostatic pressure, causing any voids in porous concrete to be filled as well as the voids in the coarse materials used for aggregates, and in many cases an agency is introduced which is sometimes destructive, thereby reducing the service of the structure. Water in contact with concrete is a definite source of deterioration due to its solvent action, causing disintegration occasioned by alternate freezing and thawing. Concrete used for a ballast deck should be of a well proportioned mix containing some integral compound if considered necessary, and well vibrated so as to produce a dense and impermeable concrete, the top surface of which should be brought to a smooth finish with proper slopes to drainage outlets.

Good Drainage Important

Ballast-deck bridges demand attention in their design. They should be designed and detailed to present a natural gravitational watershed with sufficient slope to ensure the discharge of water to drainage outlets, avoiding, wherever possible, depressions, pockets, blind gutters, etc. Care should also be taken to have the drainage outlets placed in such a location and extended sufficiently beyond the underside of the slab or structure that water so discharged does not come in contact with the underside of any steel or concrete that may be exposed to water or brine drippings from these drains, as it will cause damage to the supporting masonry or steel structure.

It is also necessary that care be taken in the detail and design of all joints required for expansion, contraction or deflection. Where the use of flexible strips of a noncorrosive metal are to be embedded in the concrete, they shall be placed in such a position that they will readily provide flexibility of the waterproofing at these locations and can be sealed effectively where the waterproofing membrane terminates, such as along the webs of girders.

Membrane Waterproofing

The membrane method of waterproofing is mostly used for ballast-deck bridges and is a treatment designed to render concrete or other structure impervious to water. Experience indicates that positive waterproofing is best accomplished by this method, in which a protective envelope is applied to the surface required to be waterproofed. This membrane is usually composed of impregnated felts and a fabric bonded together with hot mopped bitumen.

The application of these materials should in all cases be under the supervision of a foreman who is familiar with this type of work, or should be made by an experienced waterproofing firm which has done work of a similar nature.

Application

The clean, dry surfaces to be waterproofed should be given one or two applications of a primer, a thin scientifically compounded bitumen solution with a fairly quick drying quality. This primer should be brushed or mopped on concrete and metal surfaces to fill any existing pores and prevent moisture absorption, also to provide anchorage for subsequent bituminous applications. This primer is usually applied cold, although some primers are heated for their application. On surfaces that cannot be dried the application of a layer of asphalt-saturated asbestos-felt waterproofing should be laid with joints lapped at least 3 in. on the sides and 6 in. at the ends. To this

*Chairman of this committee was F. J. A. Leinweber, bridge and building master, Canadian National St. Thomas, Ont.; vice-chairman was J. S. Hancock, bridge engineer, Detroit, Toledo & Ironton, Dearborn, Mich.

primed or prepared surface various amounts of impregnated felts and fabrics bonded together with hot mopped bitumen may be applied to make up the specified envelope or membrane.

Practice varies on the different roads as to the use of felts and fabrics, felts being used primarily for water resistance and fabrics for tensile strength. A membrane consisting of three-ply fabric and four moppings of bitumen together with the primer or base felt, will, under ordinary conditions, give satisfactory results. Most failures recorded are usually traceable to poor design or faulty workmanship .

This waterproof envelope or membrane should be protected from open elements and the action of the ballast. This is accomplished by one of the following methods:

(a) A layer of poured-in-place asphalt mastic not less than 1½ in. thick.

(b) A layer of asphalt blocks or asphalt plank not less than 1 in. thick laid in an extra-heavy mopping of asphalt, with the joints filled with hot asphalt.

(c) A layer of reinforced cement mortar or concrete not less than 2 in. thick.

(d) A course of hard burned brick not less than 2¼ in. thick with joints filled with hot asphalt, except that when laid in a vertical wall or steep slope, cement mortar should be used.

Leakage Over Backwalls

One road has had difficulty with leakage over backwalls on a steel deck span and, in order to overcome this problem, it is using an apron and tail-plate assembly with membrane waterproofing, which completely covers the top and rear face of the backwall down to a depth just below the level of the bridge seat.

In detail, this road is using an apron plate of the same thickness as the existing floor plate, and electrically welded to the floor plate. To this apron plate is then welded a 3/16-in tail plate which is field sprung so as to fit tight to the rear face of the backwall at its lower end. The floor plate, apron plate and tail plate are then covered with membrane waterproofing Types (a) or (d), according to A.R.E.A. Specificatons for Membrane Waterproofng — 1942. To protect this membrane a layer of asphalt-impregnated asbestos-felt is then applied. Care is taken that the welded joint and the lower end of the tail plate are overlapped considerably, preferably a minimum of 1 ft. A slush coat of asphalt is then applied over the top surface of this treatment. To carry the water away, which may drain over the backwall, a perforated pipe is placed behind approximately 3 ft. below the top of the backwall and slope to one end for water disposal. The perforated pipe is then covered with porus backfill and ballast is replaced to original grade.

T. H. Friedlin, timber engineer, N. Y. C.; F. Dodson, assistant supervisor bridges and buildings, C. & O.; W. W. Caines, supervisor bridges and buildings, C. & O.

"Duck's-Back" Construction

Recently a most thorough and effective waterproofing repair job above and below ballast was carried out on the steel deck, of the double-track, 977-ft. steel arch and approach span bridge on the Michigan Central (New York Central) line which spans the Niagara River gorge between Niagara Falls, Ont., and Suspension Bridge, N. Y. The fouled condition of the ballast, due primarily to sand used by locomotives hauling transfer runs in both directions at slow speeds to permit checking of cars by customs, dictated its removal.

Taking one track out of service at a time, the old ballast was removed by special tools and gang organizations, and thoroughly cleaned off by chipping, sweeping and air blasting of the existing waterproofing on the deck plate. To this a fresh mopping of oxidized asphalt (Imperial 140 F.S.P.) was applied after repairing and renewing of the drainage outlets and downpipes was completed. Drainage pipes are placed 10 ft. apart and extend above the top of ballast to a point below the steelwork of the bridge. At the top end and immediately above the waterproofing, these pipes are slotted to allow the deck surface water, as well as the water that seeps through the ballast, to escape.

Sufficient new stone ballast was unloaded by a small crane to provide a depth of 4-in. under the new sawn ties that were placed, and the track was relaid and surfaced up to approximately one inch below the final grade, then tamped with electric tie tampers and brought up to final grade. The guard rails were then replaced and the track put into service so that work could be started on the westward track, which was completed in a simliar manner, taking extreme care in removing the old ballast so as not to foul the newly-placed ballast on the completed eastward track. Both tracks were then retamped and brought to finished grade after being in service for a few days, and the stone was formed by use of a template to a point 2 in. below the proposed finished grade of the final asphalt paving to be applied.

Applying the Asphalt

The asphalt paving material was then unloaded by a small crane. This material was supplied by a ready-mixed paving company and consisted of 60 per cent ¼-in. material and 40 per cent ranging from ⅛ in. to 200 mesh, to which was added 10 imperial gallons of 90-100 penetration asphalt, and 3 gal. of Diesel fuel oil as a cut back. This material is readily handled and was spread over the stone ballast to a depth of 1 in. above the finished top and then compacted to grade, providing a 2 in. surface over the stone ballast, and sloped to gutters so as to carry water to outlets and down pipes. Special tools were made to tamp this material by welding various shaped plates to tamping bits, so that tamping could be accomplished under the running rails and between the ties, as the material was sloped from 1 in. below the top of tie inside rail to 2 in. below top of the tie on outside rail.

After the paving had been completed and the entire deck surface cleaned, the paving, ties, guard rails and running rails were given a spray coat of bitumen, with a coating of fine sharp sand applied to the ties and paved surface, this sand being brushed on immediately after the spraying to prevent the bitumen from flowing toward the gutters.

Conclusion

Membrane waterproofing requires protection from the sun, and

if left exposed to the elements it will dry out and deteriorate. Hot or cold mastic, concrete, brick or asphalt plank can be used for protection. If concrete is used it is recommended that it be a mix with a coarse aggregate having a maximum size of $\frac{3}{8}$ in. and that wire-mesh reinforcing be used. A breaker sheet is sometimes used between the membrane and the protection coat. This breaker course is useful in case the protection course requires renewal before it is necessary to remove the membrane, as it is practically impossible to remove the protection coat without damaging the waterproofing when the waterproofing and protection are built integral.

Use of Drains

It should be emphasized that the quicker water can be disposed of the better. Ballast tends to disintegrate and become fouled to the extent that water cannot quickly reach the drainage outlets, in which case consideration should be given to placing flat-base or round perforated drains at strategic locations to facilitate quick drainage of water.

Construction joints are hard to waterproof effectively, and consideration should be given to the use of open joints permitting water to escape more freely, rather than design a waterproof joint that looks well on paper but is difficult to place and that may not be effective. It is to be remembered that more disintegrated concrete will be found at construction joints than at cracks in concrete that have opened up after the structure is completed.

Tests are now being made by the A.R.E.A. on many different kinds of liquid concrete waterproofings that are now being sold to waterproof concrete surfaces without the use of membrane. It is hoped that when these tests are completed and the results made available, we will know better what to use to protect concrete surfaces.

Discussion

G. S. Crites (B. & O., retired) referred to the example of the waterproofing job at Niagara Falls in the report and asked why asphalt paving was put over the ballast and around the ties. This was answered by one of the committee members who said that the paving provided a quick run-off for precipitation.

G. W. Benson (C. of Ga.) told of an expressway that was waterproofed in 1923 as recommended in the committee report. In this case almost all of the water drained over the sidewalls. Since the work was done only one small leak developed and this occurred where some soft rock had been used as ballast and gave away.

R. A. Van Ness (A.T. & S.F.) stated that he had several bridges with timber ballasted floors which had been waterproofed and then covered with unsaturated asbestos paper. These bridges, after 40 years of service, do not have any leakage through the decks.

Mechanization and Specialization of Forces

Report of Committee*

•Mechanization and specialization of forces is a subject that will start enthusiastic discussion wherever railroad men gather.

We have witnessed a tremendous increase in mechanization over the last two decades and an increasing tendency toward specialization. Mechanization is well established and we do not intend to devote this report to its justification. We are now more concerned with refinements, trends and problems. We are not so sure about complete specialization and many of us are concerned with its problems.

We have a tendency to become so engrossed in our individual problems and so absorbed in our routine work that we have too few opportunities to pause and consider the problems of our fellow workers. Conventions of men having common problems and interests are a constructive medium. We come here to find out what the other fellow is doing and receive ideas that may be helpful.

A rather comprehensive questionnaire was prepared by this committee and submitted to 30 Class I railroads. Twenty-five replies were received and we feel that this provides a representative

R. R. Gunderson
Chairman

cross section of opinion regarding our subject matter. This report has incorporated these expressed opinions and is being given in the hope that you will receive some help. We hope that it may induce some healthy discussion.

Our subjects are broad and it is difficult to properly cover them in one report. We have attempted to separate the two general subjects and shall first deal with mechanization of forces.

Work that bridge crews are called upon to preform is too diversified to permit us to cover all operations completely. However, we may enumerate some of them and compare these operations when done by hand and when done by power methods.

Maintenance of Timber Trestles

Most railroads have many miles of timber trestles that they must maintain. Materials can be handled into and out of these structures by a small derrick mounted on a track push car, operated by a hand or powered winch. Some locations and conditions permit the use of off-track cranes for this purpose. Guards, ties, stringers, caps, and braces can all be cut and drilled with power tools and the drifts and bolts applied with power hammers and wrenches. Present practice utilizes preframed and bored creosoted timbers. Field operations are thereby minimized. Power tools will conservatively save 25 per cent of the number of man-hours required for these operations when they must be performed in the field. The saving on some operations, such as drilling holes for chord bolts, will greatly exceed this figure.

We hardly think of performing steel work without the aid of power tools, but many maintenance operations are often performed by hand. Cleaning of steel, preparatory to painting, can be

*Chairman of this committee was R. R. Gunderson, assistant bridge engineer, Southern, Washington, D. C., vice-chairmen were C. A. Smith, supervisor bridges and buildings, Indiana Harbor Belt and Chicago River & Indiana, Gibson, Ind., and G. Switzer, assistant division engineer, Western Pacific, Elko, Nev.

done with sand blasting, flame softening, chipping and scaling hammers and powered wire brushes. Some spots are not accessible and some hand cleaning is essential but the largest part can be handled with power. Paint can be applied by spraying in a fraction of the time required by hand brushing, although many will question the quality of the finished work. Rivets can be heated by oil, gas, or electricity in portable heaters that better control the temperatures and are safer to use. Rivets are removed and redriven by power, producing a better job. Holes are drilled and reamed with power. Welding and cutting outfits are most helpful. Power grinders are useful. In fact so many operations are now performed with power tools that our costs would be prohibitive if we had to revert entirely to hand methods.

Mechanizing Concrete Work

Power tools and equipment are most essential for concrete work, either new construction or maintenance. Considerable work is done within short hauling distances of ready-mixed concrete plants and many companies draw heavily upon this relatively new product. A 3-S mixer, on pneumatic wheels, can be set up and used for small jobs, and 11-S mixers are easily enough handled to be used on larger jobs. Loading and unloading conveyors are available for handling aggregates and even the mixed concrete. Concrete can be pumped directly to the point of deposit. Portable pumps make water available for mixing, curing and cleaning. Paving breakers, chippers, drills, brushes and grinders rather quickly remove masonry for repairs. Power saws and drills simplify the installation of forms. Pressure grouting machines allow reintegration of masonry which otherwise might have to be completely replaced. Pressure application of cement mortar will restore entire surfaces.

A type of construction involving precast concrete slabs on concrete piles and caps is being used successfully by several roads to replace timber structures. These provide longer life and reduce maintenance expenses. Some of the abovementioned operations could hardly be performed by hand. We feel conservative in saying that savings of at least 25 per cent will be realized from use of power when the choice is available, on any but the smallest jobs.

Building crews find portable power saws and drills indispensable. One man with a power saw can frame lumber as fast as six men can install it. Prefabricating door and window frames, in many cases including installation of sash, will greatly expedite the work. Platform work can utilize saws, drills and impact hammers and increase output by close to 50 per cent. Heavy framing can be expedited with chain saws, drills and power wrenches in the assembly. Power brushes and chipping hammers will clean masonry and rake joints. Mortar can be mixed in small portable mixers. Preservative treatments can be applied with pressure sprays. Roof coatings may be pumped to the roof and applied by spraying, effecting considerable economy. We do feel that utilization of power tools by building crews will result in savings of approximately 25 per cent in labor operations.

R. D. Mitchell, general foremen bridges and buildings, G. C. & S. F.; J. S. Hancock, bridge engineer, D. T. & I.; J. F. Warrenfells, master carpenter, S. A. L.; H. M. Harlow, assistant general supervisor bridges and buildings, C. & O.

Old paint can be removed rapidly with power-driven wire brushes and flame cleaning if proper precautions are taken. A portable paint mixer will do a better job in considerably less time than stirring by hand. Paint can be applied wth spray guns and gun extension pieces can be used to minimize the moving of scaffold staging. These methods can reduce labor costs over 50 per cent.

Tools for Water Service Men

Water service crews vary considerably in the scope of their duties. The introduction of Diesel power has greatly altered the problem of maintaining pumps and other facilities. Water service crews on many roads are now primarily plumbers and sheet-metal workers. Portable pumps, drills, grinders, electric soldering irons and tin shears, and welding and cutting outfits are becoming standard equipment. A power-trenching machine will greatly expedite underground piping. Pipe cutting and threading machines can be taken to the field and powered by electric generators. Powered equipment will reduce labor costs about 50 per cent.

Many railroads have work shops, usually located at the division headquarters. The shops are equipped with wood-working tools and machines and metal-working equipment. An adjustable bench saw, radial saw, band saw, jig saw, jointer, planer, shaper and drill press will allow two men to perform work in the shop that will save at least 50 per cent in labor. Window sash and woodwork in many old buildings can only be replaced by custom-made duplicates. Prefabrication and match marking of forms for concrete work can be economically performed in a central shop and shipped to the job site for assembly. Sheet metal breaks, crimpers, corrugators, power shears, and electric soldering irons allow gutters, downspouts, fittings, heating pipes and conduits and many other products to be made economically. This same shop may be expanded to provide sharpening, and light overhaul repairs for many of the power tools and light equipment in use on the division.

A logical development is to provide proper storage and service facilities for those items of division equipment and tools that can best be utilized by pooling. Emergency repair parts should be available in case of breakdown. Automobile trucks can be serviced at the division shop, especially if they are tied up for the week end. Many roads have these facilities serving as a headquarters shop for the division traveling mechanic.

Use of Automobile Trucks

We have so far made no mention of possibly the most important trend in bridge and building crew work. Traveling bridge crews and paint crews usually move from one site to another with camp cars. However, most roads are now adding a high degree of mobility to these crews by assigning automobile trucks for their use. These trucks are being used for transporting men, materials, tools and equipment from the camp cars to the job site. A considerable amount of time can be saved this way with the additional safety of travel.

You have many times seen an entire crew sitting in the hole wait-

R. W. Humphreys, division engineer, N. P.; C. L. Waters, assistant engineer; C. C. Lederer, bridge inspector; R. T. Dedow, draftsman—all N. Y. C.

ing for lineups or clearances so that the motor car may be safely operated. This time waster and hazard is removed with trucks, although we now introduce the hazards of highway traffic. So far the safety records have proved most satisfactory. Terminal crews, water service crews, and traveling mechanics are now usually assigned trucks. The mobility of these crews has increased their available work time to a great extent. Trucks are being used successfully in trestle-filling jobs and in many cases it is possible completely to eliminate work-train expenses.

Off-track equipment is receiving increased consideration for many operations. Definite savings are possible by increased mobility, speed of movement, reducing delay to clear trains, and minimizing the use of work trains. Equipment adaptable to more than one type of operation is finding increasing favor.

A high degree of mechanization is invaluable in time of emergencies, such as at washouts, burnouts, or derailments. Continuous and safe movement of traffic is essential, and interruptions are disastrous. Anticipation of emergencies and preparedness may exert considerable influence upon the number and type of tools and equipment furnished to work forces.

Good Judgment Needed

Judgment must be used when power tools and equipment are selected and purchased. You are all familiar with the claims of what a particular tool or piece of equipment will do. Very frankly, many claims do not work out. Field conditions are not always ideal or equal to conditions on a demonstrator floor. In fact it is extremely difficult to obtain time studies for work operations and use these studies with any degree of confidence. The conditions under which you may be working will vary so much that you will either disappoint yourself or your management if you make claims that you have read some place or have been told should apply.

We are all guilty in this respect. We have observed an operation by others or listened to some individual and become so enthusiastic over possible savings that we have been led into many mistakes in the purchase of power tools and equipment. None of this has been done wilfully and our enthusiasm has been sincere. The savings are possible of attainment but we do not always obtain them. The men using the power tools and equipment sometimes have to be "sold" on the idea.

An average bridge crew of one foreman and nine men will cost about fifteen dollars per hour or twenty-five cents per minute. The utilization of power equipment to save this bridge crew's time will add up quickly, and savings accumulate rapidly. Unfortunately the reverse is also true.

Delays Are Costly

If a bridge crew is delayed 10 minutes by digging into the tool car for the power equipment and again 10 minutes by putting the equipment away at night, you have lost $5.00. It will take two men about ten minutes to set up the generator on the job, stretch out the cables and connect up the tools. There goes another 35 cents and you charge this again at night. It will cost you about ten cents to start or stop the equipment if it is in good condition and the ordinary attention during the work day will cost at least 50 cents. A balky generator that delays a bridge crew for 10 minutes costs $2.50. Then, too, you must figure that a generator costs about 55 cents per hour to operate, including allowances for overhead. This makes no allowance for the costs of your power tools which should also be added.

Air equipment costs more to set up because ordinarily you have a compressor that must be moved into position for work. You can expect an expense of at least 10 to 25 dollars to get your equipment in place, lines strung out and ready to work. You have this expense repeated when you are through with the job. It is rather common practice to cover the compressor, lock it up, and leave it at the job site, and when this is done set-up expenses are not daily occurrences as is usually the case when electric equipment is used.

We wish to emphasize these expenses. They may be overlooked when you compute savings to be made in using power equipment. If you will keep them in mind and impress them upon your foremen you will eliminate the criticism of using power tools when hand operatons would actually prove to be cheaper. Power equipment is not the final answer to maximum economy. Its use must be tempered by judgment and not wasted on minor work. If this is not done you may experience loss of your equipment to crews who will utilize its possibilities more efficiently.

Care of Equipment

One of the most serious problems confronting us is the proper care of power equipment. Many foremen and workmen dislike power tools because of the maintenance attention required, and, to say the least, it is difficult to keep the tools in proper condition. One chief engineer states that a man will sharpen his saw or his foot adze, but will neglect properly to lubricate a power tool. Hand tools may often be the property of the individual but power tools are the property of a large corporation. It is difficult to instill the same pride and care that ownership provides.

Power equipment is ordinarily rather a complex mechanism and is subject to breakdown or failure if not properly cared for. Sufficient power can be built into a tool to perform nearly any operation but the power equipment that we use has definite limitations. If men overload and abuse a machine they cause excessive wear and commonly burn it out or completely destroy it. An improperly lubricated piece of equipment will wear rapidly and commonly fail. Equipment that cannot be used on the job cannot earn a penny and overhead expenses go right on eating up savings that could be realized.

Our study indicates that approximately 75 per cent of bridge department crews are equipped with power tools. It would require an extended study to fix the dollar value of this equipment but the total would be amazingly large. Surely this reflects the confidence our managements have placed in the value of power equipment and also indicates the responsibility that we have.

We find about 75 per cent of the

companies have large centrally-located shops in which heavy repairs and overhauls are made. About 50 per cent of the lighter repairs and overhauls are made in division shops. About 70 per cent of the companies have traveling mechanics who service and make light repairs in the field. Two-thirds of the companies report that they have an organized preventive maintenance program but almost the same number report that service is given only after breakdowns occur. Seventy per cent of the companies do not require monthly condition reports on equipment. It becomes more apparent why the traveling mechanics are so broadly utilized and, the preventive maintenance programs may be subject to improvement.

Formen and even supervisors are reluctant to shop a piece of equipment when it is necessary to ship it a long distance and lose its service for a long period of time. This probably accounts for so much service being done only after breakdown of the equipment. The solution of this problem is being given very serious study by those men responsible for keeping equipment on the job and working. Off-season overhauling will work for much of the equipment but does not provide for the year-round equipment. Many roads pool equipment and thereby can assemble it periodically for overhaul. Pooling of power tools may work successfully but the lack of personal responsibility for the care of an assigned tool enters in this case.

Benefits From Equipment

A sample of opinions showed almost unanimous agreement that increased use of power tools and equipment would: (1) Increase man-hour output, (2) decrease man-hour costs, (3) improve quality of the work, and (4) result in overall economy of the work. We found that, in the opinion of the men reporting, they estimated an average saving of 31 per cent from these items. You may take this for what it may be worth, at least it is something for you to think about and aim at in your own work.

The opinion has been expressed that railroad work in general is far behind the practice of contractors in the utilization of available equipment. Our economies are not dependent upon the development of new machines but more on how we use what we have. This is borne out by the reporting railroads. We find that they consider greater savings will be obtained by the following, listed in order of importance: (1) More extensive use of power tools, (2) closer planning and supervision by officials, and (3) better training of workmen. Only one railroad considered the design of new tools and equipment as being most essential.

We do not want this to be interpreted by the equipment industry that we are complacently satisfied with their present products. Railroad work is rough work and all too often present equipment does not stand up under the conditions we subject it to. Ruggedness is essential but the resulting weight is a handicap. Alloy metals used to reduce weight often break too easily. It is almost impossible to repair most plastic parts. Many other objections could be listed but suffice to say "we are always looking for lighter and better mouse traps."

A Supervisory Problem

Getting back to savings in cost of work, the finger of responsibility points directly at the gentlemen assembled in this convention and others in like position. Each item considered most important is distinctly a supervisory problem. It is not sufficient to ask for and get more power tools and equipment, turn them over to a foreman, walk off and leave him, and expect miracles to happen.

We are now confronted with a 40-hr. week and higher hourly wage rates but unfortunately we did not have a bargaining agent that obtained less work for us to do. A little over a year ago we performed 48 hr. of work to maintain our roads according to our several standards. We do not admit that we were over maintained, or that our standards were too high. So today we have the real problem of trying to increase our man-hour output by 20 per cent in order to equal the old volume of work. We venture the guess that as of today we have not reached that goal.

It would be most helpful if you gentlemen assembled here to discuss our many problems could return to your jobs with a pat formula that would decrease your costs or increase the efficiency of your men by the minimum desirable amount of 20 per cent. You will not find such an easy answer available to you.

Closer supervision and more careful planning of work is absolutely necessary if you want to accomplish any results. This will mean that more of your time must be spent out on the job in close association with your foremen. You cannot interfere with his work. You cannot take over his work. You can help him plan his work to minimize waste time and delay. You can assist the personal welfare of your men and strive for better morale. You can improve your flow of materials and equipment to the work. You can often reduce the cost of interfering with railroad traffic by proper assignment of power equipment to the job. Cooperative relations with your operating people will pay large dividends. You can stay alert to new developments, new ideas, and suggestions. All of these and many more are your tools and their successful employment is limited only by your own ability. Our reporting roads estimate that this field can effect a 20 per cent increase in efficiency of the work.

Even though closer and more alert supervision is indicated as a need, 75 per cent of the roads do not contemplate increasing supervisory forces. More training for supervisors is thought necessary, but only a few roads report having a definite training program.

Getting Better Workmen

Better training of workmen is considered essential. Many of us have bridge crews with some old hands still left to guide the way. They are artists in their field but we are rapidly losing them, and it is my personal observation that many of the young men attracted to our work are not of the same fibre. It is also true that many of the old hands are primarily hand-tooled artists and in many cases do not take readily to new ideas. Most of the young men are receptive to suggestions and appreciate the use of power tools. They like to put the load on a tool instead of themselves and they will usually take care of that tool if they know that by doing so their work will be made easier. Many young men were in the war and came out with some training in the use of equipment. We find the commonly expressed opinion that power tools are necessary to attract new workmen and hold them is in error, except in the opinion of very few reporting roads.

Training Workmen

Staying within the limits of seniority requirements, you can see that your foremen give these young men the opportunity to use their knowledge and their abilities. You can also see that these young men work in such a way that they can be guided by the old hands and hope that they thus acquire some of their know how. Proper handling and training of workmen is probably your most difficult problem and there is no ready solution. Our reporting roads estimate that better training of workmen can effect a saving of 20 per cent in doing the work. This is worth pushing for all its full benefits.

B. J. Furniss, bridge and building supervisor, N. Y. N. H. & H.; G. M. Ryan, bridge and building supervisor, N. Y. N. H. & H.; J. W. Welch, supervisor bridges and buildings, F. E. C.

The greatest saving in cost of work is to be achieved by more extensive use of power tools and equipment. Our reporting roads estimate that a 25-per cent saving can be realized in this manner. This figure may be high but the increase of man-hour output is unquestionable, if power is judiciously applied. Machines can work for long periods and experience no physical weakening. Power is fast and does not experience fatigue. The possibilities of power is limited most by the men who use it. In the final analysis, however, any possible economies that may be realized from the use of power hinge upon the judgment exercised by the supervisor and his foremen, and the abilities of the men.

More Information Needed

This report has generalized the savings that may be effected by power tools and equipment. Some companies have made time studies of certain operations in order to be better informed as to the success of their programs. Unfortunately, the experiences of one road will serve primarily as a guide to another and not as an accurate measure. We strongly recommend that information be assembled that can be accepted and that this information be correlated. So far, most of us have been too busy using what we have available to stop and analyze what it is doing for us and what improvements can be made. An authoritative study would make an interesting and useful report at some future date.

In our general search for economies we sooner or later arrive at the possibility of using specialized forces. In our report we will refer to general composite crews as those performing all phases of work and to specialized crews as those performing work in specialized fields. We have sampled opinion on this and find some interesting results.

We find that 63 per cent of concrete work is performed by general crews on line of road and 90 per cent when within terminals. Eighty-five per cent of steel work is performed by specialized crews. Seventy-five per cent of timber bridge work is performed by general crews. General crews perform 62 per cent of building work. Division work shops, painting, and water service is performed by specialized crews to a great extent. Opinion is divided as to preferences, with 40 per cent of the reporting roads favoring specialized work crews and 60 per cent favoring general work crews.

The principal reasons expressed for favoring specialized crews were that they were more efficient, and that experience in a special type of work improves the quality of work and lowers costs.

The principal reason expressed for favoring general crews was that specialization would increase jurisdictional disputes among the crafts. Closely following was the opinion that general crews are more versatile and flexible and that transportation of the men from one job to another causes less lost work time. We received as many opinions that general work crews were more efficient and economical as were obtained favoring specialized crews. Several roads reported that they did not have sufficient work to allow for specialization of crews.

Effect of Labor Agreements

We gather from our survey that labor agreements have a strong influence on any attempt at specialization of work forces. Specialized workmen must be selected on the basis of seniority rights and cannot be hired from outside the organization. Some exceptions are possible if no men are furloughed or available on the rosters but very few men can be obtained in this manner. Many roads have no provision in their labor agreements to allow formation of system work crews.

Several roads are considering the possibility of establishing fixed headquarters for crews and having them travel by truck. Tool and material cars would be set out near the job site. Track motor cars and push cars would be retained but principal travel would be by truck. Complete camp car outfits are still used almost entirely for work on line of road but they are expensive to maintain and are becoming more so as conveniences are added. Agreements now require that camp cars be provided for many types of railroad work crews.

Specialization

Mechanization inevitably results in some specialization of individual workmen and of entire crews. The degree of specialization will require careful study by supervisory personnel in order to obtain maximum results. Power tools and equipment represent too large an investment to entrust them to anyone who does not appreciate them or will not render proper care. We now see too much damage and destruction result from carelessness and feel reasonably confident that we are not obtaining the maximum efficiency from tools and equipment that we have.

We conclude that substantial savings and increased output can be achieved by: (1) Increased and judicious use of power tools and equipment that we now have or are now available; (2) that more effort will be required from supervisory personnel in planning and coordinating work, equipment, materials, and men; (3) a program of training for supervisory personnel so that they, in turn, may institute training methods for workmen. In view of the wide difference of opinion regarding the merits of specialization we suggest that each case be weighed carefully before taking steps that may complicate future cases.

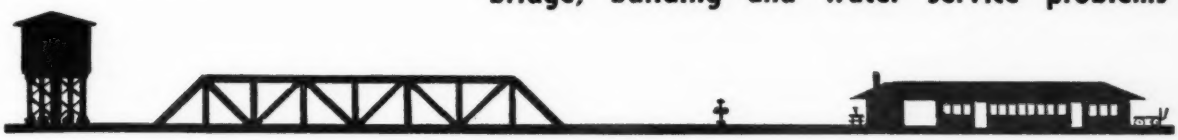
Discussion

Referring to that part of the report that described the transportation of men in trucks, J. A. Jorlett (Penna.) related that about two years ago, when a fire broke out near the tailgate of a truck carrying employees, several men were singed and burned because there was no way to signal the driver to stop. His trucks are now all equipped with an independent signal system for contacting the driver from the rear of the truck body.

G. S. Crites (B. & O., retired) observed that transporting men by motor car frequently results in overtime, whereas trucks eliminate the overtime and in addition can take the men directly to their homes. On the other hand, he warned, highway hazards and accidents are becoming more prevalent.

WHAT'S THE ANSWER?

An open forum for maintenance men on track, bridge, building and water service problems



Keeping Turntable Pits Free of Snow

What are some of the best methods of keeping turntable pits free of drifting snow? Can switch heaters be adapted to such use? If so, how?

Heaters Might Be Effective

By M. L. FREDERICK
Roadmaster, Great Northern, Spokane, Wash.

This is indeed a most interesting subject. The practice to follow must vary with the conditions encountered, i.e., climate, extreme temperature, density and volume of snow, and other factors. Manual methods of removing and disposing of snow are very costly at their best, and undoubtedly some type of heating device would prove desirable.

At Easton, Wash., in the Cascade mountains, where there is an extremely heavy snowfall, a roof was built over our turntable. This roof has proved quite effective, but such an installation would be very costly if constructed at this time. Where heavy snowfall and extensive drifting occurs, a portable snow fence would be quite effective if space would permit its installation.

At important locations at which turntables are used frequently, a heating device similar to a switch-point heater would, in my opinion, prove quite satisfactory. Such an installation would require that a tubular heating element be secured directly to the web of the circle rail and that a controlling switch be placed in a building or shelter nearby. To provide space to which melted snow can run in such an installation the circle track should be set well above the floor of the pit. In such cases a good drainage area would be provided to prevent ice accumulations.

A heating device of the type mentioned above would not eliminate all the snow that would accumulate in the pit, but could be depended on to keep the circle rail clear and the turntable operative. During periods of severe storms and extremely heavy snowfalls, other methods would undoubtedly be necessary.

Melt Snow with Heated Pipes

By ENGINEER
MAINTENANCE OF WAY

Methods of keeping turntable pits free of drifting snow vary mostly with the size of the engine terminal served by the turntable. In small terminals, turntables are likewise small and serve engine-houses with a maximum of four stalls. These locations are normally handled by a combination of snow fence and hand shovelling. The fence is set back about 80 ft. from the pit on all open sides, especially on the side of prevailing storms. Normally this is sufficient to keep the snow in the pit to a minimum and requires only a periodic clearing of the circle rail by hand.

In medium terminals in which turntables range up to 90 ft. in length and engine houses have as many as 15 stalls, snow is handled by a combination of snow fence, steam pipes and hand work. As at smaller terminals, snow fence is erected about 80 ft. from the pit on all open sides not occupied by tracks. To supplement the snow fence, snow-melting pipe coils are located around the inside of the circle rail. These coils are made of ¼-in. diameter pipe, are provided with expansion joints and

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Answers to the following questions are solicited from readers. They should be addressed to the What's the Answer editor, *Railway Engineering and Maintenance*, 79 W. Monroe St., Chicago 3, and reach him at least 30 days in advance of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you may wish to have discussed.

To Be Answered In the January Issue

1. What are the easiest and best ways to feed snow-fighting forces kept on duty long hours at terminals? At outlying interlocking plants? On line of road? Explain.

2. What are the best methods of removing ashes from basements of freight and passenger stations equipped with coal-burning furnaces? To what extent should work-saving facilities to accomplish this task be built into such stations? Explain.

3. What are the advantages and disadvantages of using two cranes for normal rail renewals? When used, how should their operation be organized and coordinated? Explain.

4. What are the advantages and disadvantages in using steel beams for caps and stringers in timber pile trestles? What steel shapes are most suitable for this purpose? Explain.

5. How often should a section foreman's track level be tested? His gage? Who should make the test in each case? How should the test be made?

6. How effective are zinc electrodes in preventing corrosion in pumps and water lines? How should they be installed? Explain.

are served by steam from the boiler plant. Where drainage is provided at pits, several coils are laid circumferentially around the pit floor, usually one around the center, one half way to the circle rail and one inside the circle-rail footings. Both of these methods have been satisfactory, the latter being used in areas where there is heavy driftings and where pits have concrete floors.

At large terminals with turntables ranging from 90 to 110 ft. in length and enginehouses serving heavy power in as many as 36 stalls, snow fencing cannot be used normally as there is no free space. As a result, it is customary to use steam coils placed on the pit floor as in the case of smaller terminals. Hot water may also be used by taking it from a standby engine after 6 in. of snow have fallen. By this method all snow can be melted and the pit cleared by three or four men in two or three hours after the storm has stopped.

There are also those who visualize certain advantages for heating pipes laid in three or four radial loops instead of concentric circles. They claim that such a system should be self-expanding, that the melted snow would have no tendency to freeze because it would flow to center drains at all times beneath the warm pipes and that, in heavy snows, the turntable itself would sweep the snow toward the heated pipe coils as engines are turned. However, to our knowledge such a system has had no service test.

Salvaging Material from Abandonments

What is the most effective and economical method of salvaging crossties, rail and bridge material from abandoned lines? Explain.*

Haul Salvage with Motor Car

By A. B. Chaney
Assistant Chief Engineer-Maintenance, Missouri Pacific, St. Louis, Mo.

The most effective and economical method of salvaging crossties, rail and bridge material from abandoned lines depends on such local conditions as parallel and access roads and highways, the length of the line, equipment available and the disposition to be made of the salvaged material.

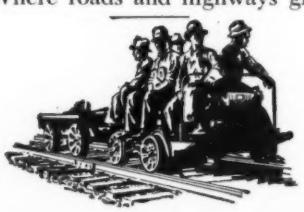
In many instances it has been found most economical to truck the salvageable materials to designated loading points by means of heavy-duty motor and push cars. Ordinarily two heavy-duty push cars are used to transport four to eight rails, together with the salvageable ties and other track material. These are pulled to a loading point by a heavy-duty motor car. While material is being loaded onto cars by a crane, the motor car returns to the point of loading with empty push cars. By using six such push cars there is no delay occasioned by the loading and unloading operations as the motor car is hauling continuously.

Loading points are usually established at auxiliary tracks, or if no such facility is available, the track being removed can be broken and one end temporarily extended to provide space for spotting push cars for unloading. Loading points are not ordinarily in excess of three miles apart.

Considerable preparatory work in connection with the removal of bridges and trestles must be done in advance of removing the track. Since the motor car and push car are comparatively light even when loaded, practically everything in the way of dismantling a trestle except the actual loading of the material can be done by the time the removal gang reaches the structure. Then it only takes a short time for the crane to remove and load the salvageable bridge timbers.

This method has the advantage of requiring the minimum force and does not require the continuous service of a work train. Train service is necessary only to remove the loaded cars and place empty cars at the loading point.

Where roads and highways give access to the track at frequent intervals, it is often economical to use motor trucks to move all salvageable rail, ties and bridge timbers to loading points. This is particularly advantageous where the line being removed has not been adequately maintained for some time. In such cases this method saves the expense of making temporary repairs required for the operation of a work train or other heavy equipment incident to removal operations. Other equipment used to advantage on our salvaging operations includes: A bulldozer to level the roadbed and to pull rail; a crawler crane to load ties that have been bundled with a sling into dump trucks, and later into cars; spike pullers; cutting torches and other equipment.



*An answer to this question was received from Royce Kershaw, Montgomery, Ala., but, because of its comprehensive nature, was withheld for publication later as a feature article.

Look—No Work Train

By Gabriel Gyanos
Extra-Gang Foreman, Central Railroad of New Jersey, Jersey City, N. J.

If the abandonment consists of a single track line, as most of them do, the most economical way to salvage the track and bridge material is to spot either a crawler crane or a truck crane at successive ½-mile intervals, and then use a bulldozer to pull all material up to that point where the crane can load it into gondola cars.

Recently the Jersey Central abandoned five miles of single track that had been built over marshes and swampland, making it difficult to run cranes along the railroad. To salvage the material from this abandonment we used a spike puller, an oxyacetylene burning outfit, a push car, a bulldozer, a crawler crane and 14 men. The 14 men included a foreman, a crane operator, a bulldozer operator and 11 laborers. After the equipment had been unloaded on the ground at the end of the abandonment, the first step in the salvaging operation consisted of having the bulldozer push three empty gondola cars ahead about a half mile. Then the spike puller pulled all spikes and the burner cut off the bars at intervals of every 10 rail lengths. After this was done the men lined the rails off the ties and loaded all fittings on push cars. When the fittings had been loaded, the crawler crane moved over the ties to where the cars were spotted.

Right after the crawler crane had passed, the gang piled up all

the usable ties and the bulldozer dragged them to the cars for the crane to load. The last thing done in this operation at every location was for the bulldozer to pull each string of 10 rails to the crane. This entire salvaging operation was performed without the use of a work train. In fact, the only locomotive used was a switch engine that removed the loaded cars and replaced them with empties.

Using Aluminum Paint on Steel Bridges

Under what conditions is the use of aluminum paint indicated for steel bridges? For other structures? What are its advantages and disadvantages? Explain.

Makes Paint Inspection Easy

By W. J. NUEBLING

Chief Engineer and Purchasing Agent, Alton & Southern, East St. Louis, Ill.

Aluminum paint is used on bridges and other steel structures that require a durable and highly visible paint. Aluminum paint has gained its reputation for protecting highway and important railway bridges throughout the country by its long service records, low cost per paint-year and attractive finish.

In addition to outstanding durability and protective properties, aluminum paint has other special advantages that make it useful in railroad maintenance. Among these advantages are its superior covering rate in square feet per gallon, unequalled hiding power in one coat, a 70-per cent reflectivity to light and heat, high visibility at night and a silvery color that enhances the appearance of any surface on which it is applied. The relatively new, ready-to-use form of aluminum paint, now generally available for brush or spray application, makes it one of the easiest paints to mix and apply even by unskilled labor.

Not the least of the advantages of aluminum paint lies in the ease of periodical inspection by maintenance engineers. When black or dark-colored paints are used, corrosion and film failures are difficult to find before serious damage has been done. With aluminum, any break in the film that results in rust formation is easily observed because a discoloring iron oxide stain magnifies the defect and leads to early detection and repair.

The principal disadvantages of aluminum paint are high cost and lack of rust inhibitive qualities which make necessary the use of special priming paints. Also, since its film is little affected by sunlight action and does not chalk, aluminum paint is not self-cleaning.

Good results cannot be secured with aluminum paints if reasonable care is not taken in the specification of the proper kind of varnish vehicle to carry the pigment. A thin, cheap, low-solids vehicle containing insufficient oils for good elasticity often has as good an initial appearance as top-quality aluminum paints made with a properly balanced formula, but early failure invariably results where these inferior liquids are employed. Therefore, aluminum paint demands extra precaution in the form of adequate laboratory inspection and close field inspection during application.

Effective for 12 Years

By JOHN L. ROHWEDDER

Materials Engineer, U. S. Engineer Office, Rock Island, Ill.

Aluminum paint properly formulated and applied on adequately primed surfaces will afford many years of protection for steel exposed to normal atmospheric conditions. Experience with several million square feet of structural steel in service bridges of dams and other metal exposed to the atmosphere in the Midwest has shown that a paint system consisting of one prime coat of red lead in oil and two finish coats of aluminum paint, applied to steel surfaces cleaned of all foreign material except tight mill scale, will afford satisfactory protection for at least 12 years. At the end of this approximate period, spot cleaning and priming and the application of one overall finish coat will extend the life of the system many more years.

There are many grades of aluminum paint, but only the very best should be used to obtain maximum durability. An aluminum paint consisting of two pounds of standard grade aluminum paste mixed with one gallon of 100-per cent phenolic-resin varnish, 33-gal. oil length, is considered very good. In new construction or maintenance painting of steel, it is important that the surfaces be cleaned to the greatest extent practicable, to remove corrosion and loose scale prior to the application of the primer paint.

In general, aluminum paint has high resistance to moisture penetration, excellent hiding power and durability, and pleasing color. The high reflectivity of this paint is one of the reasons it is selected for coating storage tanks, metal roofs, and similar structures where it is desired to reduce the interior temperatures during periods of warm weather.

Constructing Adequate Oil Separators

How should grease traps or oil separators be constructed to give the most effective results? How can the size or capacity be determined? Explain.

Separators in Great Demand

By H. D. SHOEMAKER

Principal Assistant Engineer, Northern Pacific, St. Paul, Minn.

The design of grease traps or oil separators is of considerable importance at this time because of the increasing pressure on industry from various public authorities to remove oils and greases from wastes being discharged into public waters or into public sewer systems. To provide the proper size separator, it is essential that complete information be obtained not only as to the total amount of discharge that will have to be handled but also the amount of oil and dissolved solids. The type of separator to be used is principally dependent upon the rate of flow of the storm sewer, with consideration being given to the amount of dissolved solids and suspended oil particles.

Gravity-type separators, consisting of a settling basin and a series

of baffles to collect and hold the oil, will have to be quite large to handle the discharge from an average enginehouse. Our average engine facility discharges waste water at a rate between 500 and 1000 g.p.m. This requires a gravity separator 16 ft. wide, 5 ft. deep and 57 ft. long for a discharge of 500 g.p.m., and one 20 ft. wide, 5½ ft. deep and 80 ft. long for a 1,000-g.p.m. discharge, based on the recommended separator design of the American Petroleum Institute. We have not had much success with gravity traps designed on lesser standards.

Analyses were made of two typical samples of waste water taken at one of our enginehouses. One of these taken at the river, showed that the discharge was cloudy, showed some sediment and had the following analysis of oil and grease content:

Dissolved materials	740 p.p.m.
Suspended materials	880 p.p.m.
Oils floating on the surfaces	550 p.p.m.
Total	2,170 p.p.m.
Reaction pH	6.8

Another sample was taken at the same enginehouse, at a sewer just outside a plant that reclaims journal-box packing. This waste water appeared very dirty, contained a noticeable amount of black grease and eventually mixed with the other storm and waste waters from the enginehouse. Tests of this mixture showed large quantities of oil and grease as shown below:

Dissolved & emulsified materials	4,750 p.p.m.
Sediment	640 p.p.m.
Oils and grease	7,100 p.p.m.
Total	12,490 p.p.m.
Reaction pH	11.8

Generally, an oil or grease trap should be designed to reduce the amount of oil or grease to about 50 p.p.m. To provide a satisfactory oil trap from an operating standpoint, provision should be made for a pump to handle the trapped oil to the surface in order to provide an easy method of disposing of it. The oil can either be pumped into barrels and then wasted or used for oiling roads or walkways around the property. Because it is difficult to build gravity separators large enough to give the required capacity and difficult to maintain them after they are built, considerable interest has been shown by this railroad, as well as several others, in a metal separator that, although it is a gravity separator, has baffles to slow down the effluent and provides the necessary retention time. It appears now that this patented metal separator will do a better job of removing oils and greases at less cost than a straight gravity trap. At least this type of trap can be more readily cleaned and serviced.

Using Electric Lamps on Switches

To what extent are electric switch lamps adaptable to use in yards? To main-track outlying switches? What types are available for such use? Explain.

Oil Losing Its Advantage

By G. M. O'Rourke

Assistant Engineer Maintenance of Way, Illinois Central, Chicago

Higher wages and the increased cost of oil and wicks are gradually reducing the economic advantage oil lamps have enjoyed in the past, and I think more yard switch lamps will be electrified in the future. Recognizing that the light provided by electricity is superior to that of burning oil, the Illinois Central electrified the switch lamps in some yards years ago.

Actual costs and estimated costs of electrifying oil-burning switch lamps at various places, depending upon the source of power, range from $87 to $170 per switch. Where power is available nearby I should say that an estimate of $98 is reasonable. Actual costs and estimated annual costs of maintaining electric switch lamps are from $11.50 to $32.00, with a mean of $18. With today's improvements an estimate of $15 per lamp may be equitable. Costs of operating and maintaining oil-burning switch lamps swing from a low of $22.32 per lamp to a high of $58.50. If an average of $40 is used the saving will be $25 per lamp per annum.

One of our neighboring railroads made a very thorough study of the question and by installing electric lamps in one of its large yards, it anticipates a saving in labor of $17,000 per year and a saving of $750 in the cost of electricity versus that of kerosene. This total of $17,750 equals $18.82 per annum per lamp. This road's estimate of the first cost of installation is $67.55 per lamp.

I believe the increasing use of electric switch lamps should be encouraged, but doubt that there is any economy where the switches are widely separated, such as at main-track outlying switches. In compact classification yards in which wiring may not be a serious problem, there will probably be economies in the use of electric switch lamps.

One installation on our railroad includes two No. 4 weatherproof wires on a pole line that serves as a power line for switch lighting. The wires are carried down each pole of the line in a ½-in. conduit to a fuse box in which they are connected to two-conductor, No. 16 Tirex rubber cable. This rubber cable is laid underground, at a depth of approximately two feet, to junction boxes mounted on 4-in. by 4-in. wood posts located adjacent to the tracks. Current for an average of four lights is supplied from each junction box. Standard switch lamps, fitted with light sockets, are used with 110-volt, 16-candlepower carbon lamps. These switch lights are controlled from the powerplant switchboard by means of an oil circuit breaker, which is operated by the night fireman at the plant. Lights are turned on at dusk and off at daylight.

Test installations were recently made of electric switch lamps operated from primary batteries on two switches—one on the inbound and another on the outbound lead of one of our yards. The installation at the outbound switch consisted of: 1 Raco cast-iron battery box; 1 Edison Carbonaire battery-Type 2-S-J-1; and 1 Adams & Westlake switch-lamp adapter.

The installation at the inbound switch consists of: 1 Permacrete concrete battery box; 1 Eveready air cell—type T-2600; and 1 Raco switch-lamp adapter.

The Edison battery has a capacity of 1,000 ampere hour and should last approximately 250 days. The Eveready battery has a capac-

ity of 600 a.h. and should last 160 days. Each installation was made by a signalman in three hours at a total cost of about $38 for labor and material. Annual operating costs are estimated to be around $16.

Battery and Lamp Devised

By W. A. Melroy* and Gordon Dille**

We do not feel that anyone in either of our companies is qualified to answer this question comprehensively. Only a railroader could do that. We do feel, however, that we can pass along information on a new primary battery and a new light bulb that might affect the adaptability of electric switch lamps to specific installations.

The operation of oil-lighted switch lamps requires frequent attendance in order to assure a continuous and acceptable night-light indication. Realizing that, in many instances, the cost of operating each oil-lighted switch lamp is averaging around $40 or more each year, with the operating cost of many oil lamps greatly exceeding this figure, the Thomas A. Edison Company designed a battery of two series cells of the air-depolarizing, add-water type, sealed in a single, molded, hard rubber case. Known as the Edison Carbonaire battery, Type 2-S-J-1, it has a capacity of 1,000 a.h. at a nominal voltage of 2.5.

This battery is supplied in an inactive condition which means that full rated capacity is assured whenever the battery is placed in service. Activation is accomplished by simply adding approximately three pints of any clear water to each cell of the battery. This water may be added at a central point or at the switch-lamp location. When ready for service, the battery weighs only 26 lb., is 8¼ in. long, 7¼ in. wide, and 9½ in. high. It is readily transportable and easily handled by one man.

In switch-lamp service, the consumption of electrical energy is relatively constant, and it is therefore practicable to calculate accurately the life of the battery so that it may be replaced at the proper time. When operating a switch lamp, which is lighted continuously, the Carbonaire battery has a life of 10 to 12 months, depending upon the particular lamp bulb used in the switch lamp.

There are several types of lamp bulbs that may be used in switch-lamp lighting service that are especially suitable for use with this Carbonaire battery. One of these is a new bulb designed by Westinghouse Electric Corporation specifically for use with the Carbonaire battery. This lamp is available in ratings of 0.15 amp. at 2.7 volts, and at 0.12 amp. at 3.5 volts. Its life is expected to exceed the 10 to 12-month life of the battery, but for lowest maintenance cost should be replaced at the time the battery is replaced. The inside frosting of the bulb diffuses the light to approximately oil-lantern-flame size, making it possible to retain existing optical systems in converting.

To change from oil to battery operation is a relatively simple task. A suitable battery housing is installed either between the switch timbers or at some other suitable point, a two-conductor cable is connected from the battery housing to the switch-lamp unit, and the oil lamp is either converted from oil to electric operation or a new all-electric unit may replace the oil lamp.

The conversion of an oil lamp to make it suitable for battery operation requires the installation of an electric adapter so that the electric luminant will be located in the same relative position as the oil flame. Suitable adapters for conversion are available from several sources. When converting, it is also desirable to close up the opening at the top of the switch-lamp body to prevent rain, snow and dirt from settling on the inside of the lenses.

There are several advantages in replacing the oil lamp with an all-electric switch-lamp unit, although this is not altogther necessary. Doing this saves labor needed to convert the old oil lamp, assures the proper focus of the lamp bulb, and the new electric unit will usually have a much longer service life than the converted oil lamp.

The total installation cost for changing from oil to Carbonaire battery operation will vary with equipment used, but generally it may be said that this cost will be between $40 and $60, including the necessary labor. The yearly operating cost per lamp will usually be not more than $15, for replacement materials and labor. This means that Carbonaire operation of switch lamps can provide a saving of $25 and upward per year. The initial cost of changing over to Carbonaire-battery operation is often returned by maintenance savings during the first year with a gain in uniform, dependable light indications.

*Primary Battery Division, Thomas A. Edison Company, Bloomfield, N. J.

**Technical Press Service, Public Relations Department, Westinghouse Electric Corporation, Pittsburgh, Pa.

Installing Moving Stairs in Stations

What features of design should be incorporated in moving stairways to adapt them to the modernization of passenger stations? Why? What safety measures are advisable to minimize accidents on moving stairways? Explain.

Make Wide and Reversible*

By C. E. Lex, Jr.

Assistant Engineer Buildings, Norfolk & Western, Roanoke, Va.

The average moving stairway is 3 ft. wide between handrails, moves at the rate of 90 ft. a min., and can carry up to 6,000 persons per hour, which is sufficient for the majority of installations. The 3-ft. width between handrails has been found necessary since most passengers carry their hand baggage and a stairway with less width is not too satisfactory.

A 3-ft. wide moving stairway with a vertical rise of 21 ft. requires a stairwell with an out-to-out width of 7 ft. 6 in. and a length of 67 ft., which cuts down sharply on the side clearance between the stairwell walls and adjacent tracks, and eliminates that portion of the platform for the loading or unloading of baggage unless the track centers are shifted to give a minimum platform width of 10 ft. 6 in.

The reversible type of moving stairway is best suited for installation in a passenger station since, after arriving passengers have been moved to the concourse level, the

*This answer is an abstract of an address given by Mr. Lex at the annual meeting of the American Railway Engineering Association last March and published in full on pp. 810-811, Vol. 51, A.R.E.A Proceedings.

direction of travel of the stair can be reversed and the departing passengers moved to the track level. This reversing of the direction of travel can be controlled by a key-operated switch located at the top or bottom of the stairs, as desired, and the attendant can reverse the direction in a matter of seconds.

Because moving stairways may be hazardous to the uninitiated, certain safety precautions should be taken in connection with their use at passenger stations: (1) Paint the landing plates at both top and bottom of the stairs with diagonal red and white stripes so they will contrast sharply with the color of the moving treads, (2) paint a one-inch wide white or focal-orange stripe on each tread at the nosing to show more clearly where the break occurs, (3) paint one-inch wide stripes on the moving handrails at three-foot intervals to show more clearly that these handrails are moving; (4) install on each side of the stairway housing, at both bottom and top, signs reading "Please Hold Handrail", or signs with similar wording. These signs may or may not be illuminated, depending on the lighting arrangement in the stairwell.

Moving stairways are expensive to install, and safety precautions must be taken to keep falls on them to the minimum. But the installation of a moving stairway in a modernized passenger station which has long, steep stairs leading to the track level will speed up the transfer of passengers to and from the track level, and will greatly improve public feeling toward the railroad.

Applying Color to Stucco and Concrete

To what extent is it practical to introduce color in stucco? In monolithic concrete? How is this done? Explain.

New Method Effective

By Architectural Engineer

For many years there have been three generally-accepted methods of introducing color into portland-cement stucco or concrete: (1) Adding mineral coloring pigments; (2) using colored aggregates; and (3) combining coloring pigments and colored aggregates. The Portland Cement Association has only recently perfected a fourth method which they call the "aggregate-transfer method".

To save expense in the first three methods the coloring material is only used in the final coat of stucco and only as a facing mixture on concrete products or monolithic concrete. In the new aggregate-transfer method the special colored aggregate is likewise limited to a thin layer at the surface. However, this last method is adapted only to structural concrete and not to stucco.

According to the Portland Cement Association brochure* on the aggregate-transfer method, "the special facing aggregate is transferred from the form face to the structural concrete with which it becomes an integral part because of the complete bond with the mortar in the concrete. Liners of thin plywood or other suitable material to which the facing aggregate is attached by means of a special adhesive are positioned in the form for the exposed face. The reinforcing and back form are then erected and the form is filled with concrete made with the usual aggregates used for structural concrete. After stripping the form and liner, the surface of the concrete is treated to expose the special facing aggregate. Either rough or smooth-textured surfaces can be obtained.

"Liners for aggregate transfer should not exceed 4 ft. by 8 ft. in size and should be of ¼-in. plywood or other satisfactory material. Where the work is such that the liners may be used several times, plywood of concrete-form grade is recommended, but cheaper grades of plywood are suitable where the liners are to be used only once.

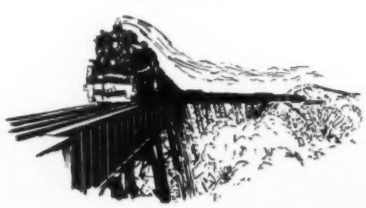
"The first step is to erect the face form which is to receive the liners. It should be carefully aligned and braced. The walls are toe-nailed or otherwise fastened to the studs to hold them in position during erection and in order that spreaderties will function properly Plywood sheathing for the forms is preferable but accurately-fitted, dressed lumber may be used. The sheathing must form a solid backing for the liners; open sheathing is not satisfactory as it results in bulging of the liners. Whether plywood or dressed lumber is used it should be heavy enough so that it will not bulge between studs.

"The liners are cut and fitted to the facing form, leaving joints not more than 1/32 in. wide between liners, which space is filled with joint compound at the time liners are erected. The amount of cutting and fitting will depend on the amount of straight wall, corners, offsets and other details. On large, plain surfaces at least the end liners must be prefitted and the intermediate liners cut accurately to proper sizes. In most cases it is desirable to prefit all of the liners before they are prepared with the aggregate.

"After the liners have been cut and fitted they are removed to a bench and the face to be treated is oiled lightly, removing all excess oil with cotton waste or a rag. This surface is then given a protective coating by brushing on some of the water-resistant adhesive thinned to the consistency of lacquer. This coating is allowed to harden for two days.

"After the lacquer coating has hardened for two days the liner is clamped to a vibrating table and a strong, water-resistant adhesive is brushed on and the aggregate is applied immediately. This aggregate is sprinkled on the liner by hand until about 95 per cent coverage is obtained. The liner is then vibrated and additional aggregate is placed where necessary to complete the coverage."

The brochure goes on to explain that after the adhesive has dried for 24 hr. the liners are ready for attaching to the forms. After the concrete has been poured into the forms and allowed to harden, the structural forms are removed but the liners are stripped later—usually about five days after placing the concrete. When the liners are stripped the colored aggregate remains bonded to the wall by the mortar and is ready for finishing into any of several desired textures.



*Obtainable by writing the Portland Cement Association, 33 West Grand avenue, Chicago 10.

PRODUCTS OF MANUFACTURERS

New, improved equipment, materials, devices

(For additional information on any of the products described in these columns, use postcards, page 999.)

Above—The digging head of the Super Mole is similar to that of a standard Mole.

Below—Spoils conveyor at rear is adjustable both vertically and horizontally

NEW SHOULDER BALLAST CLEANER

THE Railway Maintenance Corporation, Pittsburgh, Pa., has developed a shoulder ballast cleaner, called the Super Mole, which has a much greater cleaning capacity than the standard shoulder Mole. Tractor mounted, the machine incorporates a digging head similar to that of a standard Mole, from which the fouled ballast travels upward and backward on a conveyor to a vibrating screen which separates the dirt from the ballast. The clean ballast is discharged back to the shoulder at the rear of the machine and the dirt is discharged by a spoils conveyor which can be set at any angle horizontally and at angles up to 30 deg. vertically if loading of the dirt is desired. The machine is 20 ft. long, 8 ft. 8 in. high and has a digging width of 4 ft. 8½ in.

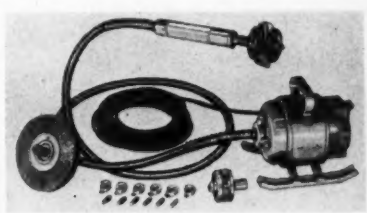
The travel speeds of the tractor range from 1.5 m.p.h. in first gear to 5.4 m.p.h. in fifth gear. Cleaning speeds range from 1,200 ft. per hour up to 4,235 ft. per hour. Under heavy digging conditions, of course, the machine is used in the lower speed ranges.

The present pilot model is being used in conjunction with a tractor and plow which turns the ballast at least 24 hr. ahead of the cleaning operation. This is done to permit the ballast to drain and dry out before cleaning, with the result that a better cleaning job can be accomplished.

The Super Mole is operated by hydraulic controls. It is said that it can be easily maneuvered in and out as necessary to keep the digging edge against the tie ends at all times. It can also be maneuvered easily around obstructions, across road crossings and over rails to operate on the other side of the track. The machine is operated by one man. However, another man sometimes works behind the machine to adjust ballast distribution and the dirt-disposal conveyor when necessary.

ELECTRIC CHIPPING HAMMER

THE Arnessen Electric Company, Inc., New York, has announced an improved model of its electric chipping and scaling hammer for fast removal of rust, scale or paint from metal surfaces. In this device a motor, through a flexible shaft, drives various types of scaling heads, including double or single finger heads, double or sin-



The Arnessen electric chipping and scaling hammer

gle gear wheel or wire-brush heads. It can be used effectively not only for removing paint or rust from large metal surfaces, but also, using a suitable head, from corners, angles, seams and other tight places. With this tool, it is reported that one man can accomplish as much work as eight men using the usual hand methods.

OFF-TRACK BALLAST CLEANER

SEVERAL years ago the Southern built an experimental shoulder ballast cleaner consisting essentially of a standard Athey force-feed loader and conveyor fitted with a vibrating screen and another conveyor for wasting dirt. From this basic design the Athey Products Corporation, Chicago, has constructed, to specifications of the Southern, a much-improved version, mounted on a Caterpillar D-4 tractor, which has loading speeds ranging from 0.3 m.p.h. to 0.6 m.p.h., and which can travel at speeds up to 5.4 m.p.h. The machine is equipped with hydraulic controls and can be operated by one man from a high seat which gives him good visibility in all directions. The unit is 32 ft. 4 in. long, 5 ft. 10 in. wide and 8 ft. 10 in. high.

In cleaning ballast with this machine, the ballast is first windrowed, after which, if possible, it is given time to aerate. Then, with its guide shoes flush against the tie ends, the ballast cleaner picks up the fouled ballast, carries it over a paddle wheel onto a conveyor belt which discharges it onto a 4-ft. by 7-ft. shaker screen with ¾-in. openings. The waste material falls through the screen and is discharged away from the track, and the clean ballast is placed back flush against the ties in uniform windrows.

Above—Showing how Athey ballast cleaner picks up the windrowed fouled ballast

Below—Dirt is discharged away from track and clean ballast is placed against ties

For additional information on any of the products described on this page, use postcards, page 999.

ALUMINUM JACK

THE Duff-Norton Manufacturing Company, Pittsburgh, Pa., has announced the Model 517-BA track jack which, incorporating an aluminum housing, is said to be 25 per cent lighter than previous models. Other features of the new jack include a special thumb guard for protection while tripping the jack, spring-actuated pawls to prevent accidental tripping, and a bail-type handle for easy carrying and spotting.

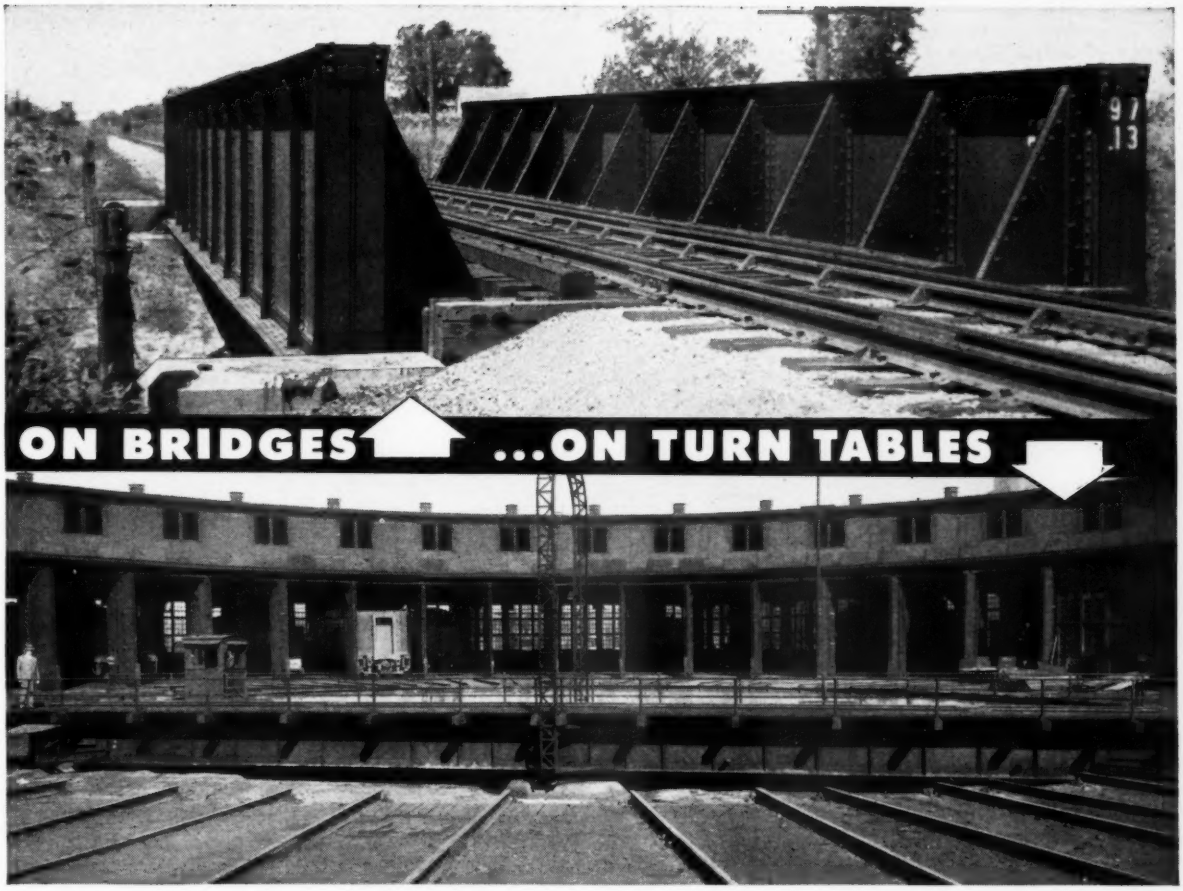
The Duff-Norton 517 BA track jack

The new jack will raise a 15-ton load 5 in. When lifting at tie ends, tie cutting is minimized by the large bearing area (2½ in. by 3 in.) of the toe. The jack rack is 1⅝ in. square.

PROTECTIVE COATING

THE Union Carbide & Carbon Corp., Bakelite Division, New York, has announced a combination protective and decorative coating for both interior and exterior surfaces, which, incorporating Vinylite resins, is said to be washable, easy to clean, impervious to the strongest washing compounds, and resistant to fumes and to most acids and alkalies. Furthermore, according to the manufacturer, the coating is nonflammable, is odorless when dry, withstands temperatures up to 160 deg. F., seals most masonry surfaces completely, dries in 5 to 10 min., and requires little thinning. The material can be applied with con-

(Continued on page 1062)



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In the railroad industry, rust constantly threatens . . . on bridges, turntables, track scales. To protect the surfaces of such valuable installations rely on NO-OX-ID "A Special."

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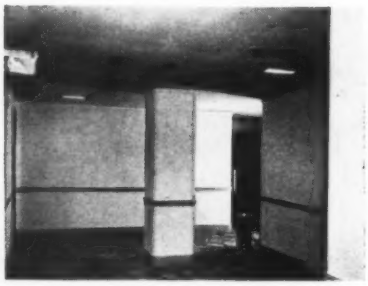


An interior decorated and protected by the new Bakelite plastic coating

ventional spray equipment, and is available in flat, semi-lustre and gloss finishes, and in any desired color.

MIGHTY "MIDGET" PULLER

THE Coffing Hoist Company, Danville, Ill., has announced a hand-operated hoist or puller, called the "Mighty Midget", which weighs 9½ lb., takes up less than a foot of space, and can handle a 1,000-lb. load on any lifting, stretching or pulling job. It is equipped with a handle which may be used either as a straight lever when loads are heavy or as a crank for high-speed lifting or pulling. In the latter case the lower section of the handle is locked at right angles to the upper. A smaller model of the hoist, with a capacity of 500 lb., and weighing 6½ lb., is also available.

The Coffing "Mighty Midget" hoist

The Gravely tractor with a snow-blower attachment

SNOW BLOWER FOR GRAVELY TRACTOR

THE Gravely Motor Plow & Cultivator Co., Dunbar, W. Va., has developed a snow-blower attachment for its 5-hp. tractor, thus increasing to 20 the number of attachments now available for the unit. The snow blower is reported to be capable of cutting a swath 25 in. wide through snowfalls up to 4 ft. deep. It can be quickly adjusted to throw the snow either to the right or to the left and at any angle desired by the operator.

The Jordan Roadmaster spreader-ditcher which is said to be capable of bucking snow up to 7 ft. deep without special attachments

LATEST MODEL OF THE JORDAN SPREADER

THE O. F. Jordan Company, East Chicago, Ind., has announced a new model of the Jordan spreader-ditcher, called the Roadmaster, which is reported to be capable of bucking snow drifts up to 7 ft. deep without special attachments. This performance is made possible by a V-type plow mounted at the head end of the machine and an arrow-shaped steel underframe specially designed to withstand unusually severe shocks and strains.

The plow is equipped with manganese-steel cutting blades and rail shoes which permit vertical adjustment of the plow in 1-in. increments from 1 in. to 5 in. below the top of rail. The plow structure entirely encloses the front trucks of the machine and thereby provides clean running rails for the machine and for work-train equipment following behind it. Hinged to the plow, one at each side, are two extension wings for widening snow cuts and for snow-removal work in yards or other multiple-track territory. If desired, a high snow-plow attachment, capable of handling snow in depths up to 12 ft., may be readily applied to the machine.

"I WOULD SAY THAT OUR BRUSH CONTROL PROGRAM MAY HEREAFTER INVOLVE A LARGER PROGRAM WITH YOUR COMPANY THAN OUR PROGRAM USING 'HERBICIDOL' WEED KILLER"

This remark coming from the Engineer Maintenance of Way of a large system was of more than ordinary interest to us. He went on to say:

> "The cost of mowing has moved higher and higher, due not only to increased labor costs, but also due to the uncertain contribution on the part of labor. The test work you did for us in 1949 using chemical for control of brush, has satisfied us that the use of this type of chemical is going to save us big money.
>
> "Constant use of 'HERBICIDOL' has given to us a roadbed which is now relatively clean. We hope to bring about the same relative condition in brush control work using Reade's BRUSH KILLING CHEMICAL."

The pattern set by this able engineer might well be followed by other maintenance engineers.

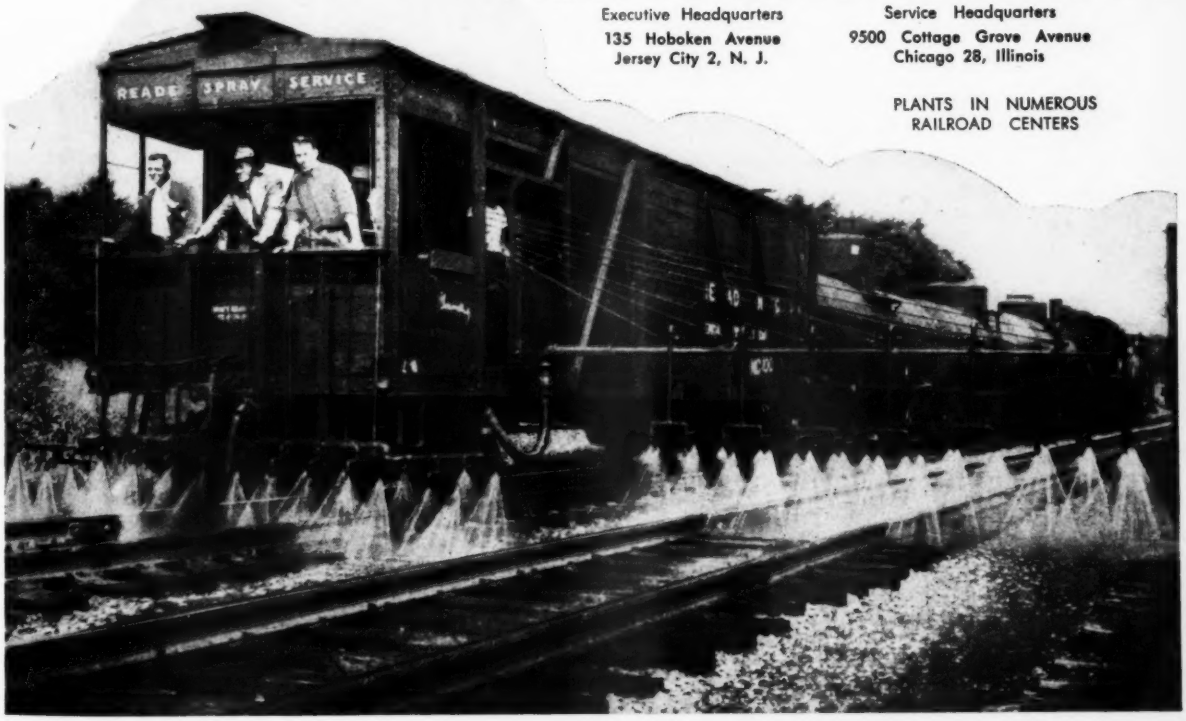
We will welcome the opportunity of reviewing the subject of brush control with you, offering suggestions for a 1951 program.

READE MANUFACTURING COMPANY, INC.

Executive Headquarters
135 Hoboken Avenue
Jersey City 2, N. J.

Service Headquarters
9500 Cottage Grove Avenue
Chicago 28, Illinois

PLANTS IN NUMEROUS RAILROAD CENTERS



THE MONTH'S NEWS

Railway Personnel

General

W. H. Kendall, assistant to president of the Atlantic Coast Line, at Wilmington, N.C., and an engineer by training and experience, has been elected general manager of the Clinchfield, with headquarters at Erwin, Tenn.

M. B. Oliver, assistant to the general manager of the Atlantic Coast Line, at Wilmington, N. C., and an engineer by training and experience, has been appointed personnel officer, with the same headquarters.

C. R. Lapeza, office engineer on the Atlantic Coast Line, has been appointed assistant to general manager, with headquarters as before at Wilmington, N. C.

C. E. Crippen, general superintendent on the Chicago, Milwaukee St. Paul & Pacific at Milwaukee, Wis., and an engineer by training and experience, has been promoted to general superintendent of all terminals, with headquarters at Chicago.

Karl A. Borntrager, general manager of the Big Four district of the New York Central, with headquarters at Cincinnati, Ohio, and an engineer by training and experience, has been appointed general manager of the Michigan Central, with headquarters at Detroit, Mich., succeeding **Frank McElroy,** who has retired.

R. B. Smith, assistant general manager on the Chicago, Rock Island & Pacific, with headquarters at Des Moines, Iowa, and formerly track supervisor on that road, has been transferred to El Reno, Okla. **C. H. Hardwick,** superintendent of the Arkansas division, at Little Rock, Ark., and formerly engineer maintenance of way, has been transferred to the Des Moines division, with headquarters at Des Moines.

Engineering

Carl O. Bird, assistant engineer in the office of maintenance of way assistant to the vice-president, New York Central System, has been promoted to engineer of standards of the system, with headquarters as before at New York.

W. E. Free, roadmaster on the Atlantic Coast Line at Albany, Ga., has been appointed office engineer in the office of the chief engineer at Wilmington, N. C., succeeding **C. R. Lapeza,** whose appointment as assistant to general manager is noted elsewhere in these pages.

Donald E. Hiltz, transitman on the Dominion Atlantic Railway at Kentville, N.S., has been appointed assistant engineer on the Canadian Pacific, with headquarters at Saint John, N. B., suc-

ceeding **J. Edward Reynolds,** whose appointment as roadmaster is noted elsewhere in these columns.

W. L. Lloyd, assistant engineer on the Pennsylvania, has been promoted to fuel engineer in the traffic department at Philadelphia, Pa.

Albert J. Spaeth, resident engineer on the Reading, has been appointed assistant to chief engineer; **W. H. Eckenbrine,** assistant engineer, has been named acting resident engineer; and **J. K. Fisher,** assistant engineer, has been advanced to construction engineer.

Edward O. Reedy, assistant engineer on the Louisville & Nashville at Latonia, Ky., has been transferred to the miscellaneous department of the chief engineer's office at Louisville, Ky. **Joseph C. Overmann,** draftsman in the miscellaneous department, has succeeded Mr. Reedy.

William J. Clair, assistant division engineer on the Michigan Central, with headquarters at Detroit, Mich., retired recently after 43 years of service.

W. B. Small, draftsman in the engineering department of the Norfolk & Western, has been appointed resident engineer at Roanoke, Va., to succeed **C. J. French,** who has retired after 48 years of service.

Felix Bareis, assistant engineer on the Cleveland division of the New York Central, retired recently after 34 years of service, and **Charles A. Knieling,** assistant engineer at Cleveland, has retired after 45 years of service.

R. J. Coffee, assistant division engineer on the Chicago, Milwaukee, St. Paul & Pacific, has been promoted to division engineer, with headquarters as before at Terre Haute, Ind. He succeeds **W. C. Whitham,** who has been transferred to Spokane, Wash., to replace **B. E. Daniels,** who has been transferred to Aberdeen, S.D. Mr. Daniels succeeds **B. J. Worley,** who has been transferred to Chicago to replace **K. L. Clark,** who has been promoted to assistant engineer in the chief engineer's office, Chicago.

Arthur Price, division engineer of the Marion division of the Erie, with headquarters at Huntington, Ind., has been transferred to Jersey City, N.J., to serve in the same capacity on the New York division and branch lines, succeeding **Lawrence H. Jentoft,** who, in turn has been transferred to Hornell, N. Y., in charge of the Delaware, Susquehanna and Tioga divisions to succeed **Ransom L. Dyke,** who has retired after more than 44 years of service. **Walton E. Smith,** track supervisor at Campbell Hall, N. Y., has been promoted to assistant division engineer at Salamanca, N. Y.

C. A. Colpitts, district engineer of the British Columbia district of the Canadian Pacific at Vancouver, B. C., has been appointed engineer of track of the

(Continued on page 1066)

Railway Personnel (Cont'd)

system at Montreal, Que., succeeding **R. A. Emerson,** whose promotion to assistant chief engineer was noted in the October issue. **C. K. Holden,** special engineer, has been appointed district engineer of the Manitoba district, with headquarters as before at Winnipeg, Man., succeeding **T. W. Creighton,** who has been transferred to Vancouver, to replace Mr. Colpitts.

Clifford G. Davis, whose promotion to assistant chief engineer of the Kansas City Southern, with headquarters at Kansas City, Mo., was announced in the

Clifford G. Davis

October issue, was born at Peterton, Kan., on March 10, 1901. He entered railway service with the K.C.S. in July, 1918, after graduation from high school, as a chainman in the division engineer's office at Pittsburg, Kan., serving in this and other capacities until 1922, when he entered the University of Kansas. Upon graduation in 1926, with a Bachelor of Science degree in civil engineering, Mr. Davis rejoined the engineering department of the K.C.S. In May, 1943, he was appointed engineer-roadmaster at Kansas City, and in June, 1945, became division engineer of the Chicago, Milwaukee, St. Paul & Pacific-Kansas City Southern joint agency at that point. He served in this capacity until his recent promotion to assistant chief engineer.

Track

J. Edward Reynolds, assistant engineer on the Canadian Pacific at St. John, N. B., has been appointed roadmaster at Ottawa, Ont.

William Gorman, track supervisor on the Atchison, Topeka & Santa Fe, has been tranferred to the Eastern division at Emporia, Kan., succeeding **George E. Tressler,** who has resigned.

J. W. Conroy has been appointed roadmaster on the Atchison, Topeka & Santa Fe, with headquarters at Parker, Ariz., succeeding **J. K. Yoakum,** who has been assigned to other duties.

George E. McWhite, Jr., senior assistant engineer on the Atlantic Coast Line, has been appointed roadmaster at Albany, Ga., succeeding **W. E. Free,** whose promotion to office engineer is noted elsewhere in these columns.

Michael J. Carroll, assistant supervisor of track on the New York Central, at Corning, N. Y., retired recently after 47 years of service.

David M. Engler has been appointed supervisor of track on Subdivision 18, St. Lawrence division, of the New York Central, at Gouverneur, N. Y., and **Arthur F. O'Brien** has been appointed assistant supervisor of track on Subdivision 1, Electric division, with headquarters at New York.

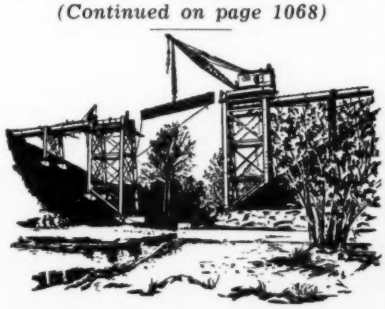
L. R. Hall, roadmaster on the Chicago, Burlington & Quincy, with headquarters at Hannibal, Mo., has been appointed construction roadmaster on the Centennial Cutoff, with headquarters at Chillicothe, Mo. Mr. Hall is succeeded by **J. R. Morton,** track supervisor at Chillicothe, who in turn, is succeeded by **R. R. Hall.**

J. L. Gibbs, roadmaster on the Seaboard Air Line, with headquarters at Hamlet, N.C., in charge of the district between Hamlet and Andrews, S.C., has been transferred to Arcadia, Fla., in charge of the districts between Mulberry and Port Boca Grande, and Arcadia and Fort Myers, to succeed **R. L. Scott,** who, in turn, has replaced Mr. Gibbs at Hamlet.

A. Holmstrom, roadmaster on the Canadian Pacific of the territory east of Kenora, Ont., has been transferred to the Kenora-west territory to succeed **George Larson,** who has retired. **L. R. Weare,** roadmaster at Ignace, Ont., replaces Mr. Holmstrom. **R. Mykle,** roadmaster at Fort William, Ont., has been transferred to Ignace to succeed Mr. Weare. **A. Swanson,** roadmaster at Broadview, Sask., has been transferred to Fort William, to replace Mr. Mykle, and **Mr. Pashniak,** roadmaster at Assiniboia, Sask., in turn, succeeds Mr. Swanson. **R. P. Rogal,** relieving roadmaster at Moose Jaw, Sask., has been promoted to roadmaster at Assiniboia to replace Mr. Pashniak.

H. E. Richards, junior engineer on the Middle division of the Pennsylvania, with headquarters at Huntingdon, Pa., has been promoted to assistant supervisor of track on the Maryland division, at

(Continued on page 1068)



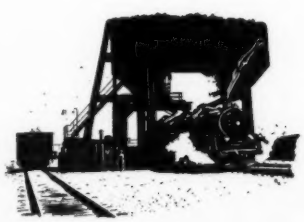
Railway Personnel (Cont'd)

York, Pa., succeeding **J. J. Lockhard,** who has been transferred to the Philadelphia Terminal division, at Philadelphia, Pa. **W. E. McCoppin,** junior engineer on the Pittsburgh division, has been promoted to assistant supervisor of track on the Susquehanna division, at Williamsport, Pa., succeeding **D. H. Cushwa,** who has been transferred to the New York division, at Jersey City, N. J. **R. E. Kleist,** supervisor of track on the Lake division at Orrville, Ohio, has been transferred to Alliance, Ohio.

Andrew James Heacox, whose promotion to supervisor of track on the Pennsylvania, at Grand Rapids, Mich., was noted in the October issue, was born in Clay County, Ind., on October 8, 1908. He entered railroad service with the Pennsylvania in November, 1926, as a trackman, subsequently serving successively as assistant foreman, machine operator, extra gang foreman, construction foreman and general foreman, until January 2, 1948, when he was advanced to assistant supervisor of track on the Chicago Terminal division. On August 1 of that year, Mr. Heacox was transferred to the Middle division with headquarters at Newport, Pa., where he served until his recent promotion to supervisor of track.

Charles T. Popma, whose promotion to supervisor of track on the New York Central, with headquarters at Jackson, Mich., was announced in the October issue, was born in that city on August 26, 1920. He entered railroad service with the N. Y. C. in June, 1937, as a laborer at Jackson. Three months later, while studying at the University of Michigan, he was appointed chief of a surveying party at Jackson and Toledo, Ohio. In August, 1942, Mr. Popma joined the U. S. Army, serving in the European Theatre. After leaving the armed forces in March, 1946, he returned to the university and was graduated in June 1947, with a degree of Bachelor of Science in civil engineering. Mr. Popma then returned to the N.Y.C. as chief of a surveying party at Jackson and Niles, Mich., and served in that capacity until January, 1948, when he was appointed assistant supervisor of bridges and buildings, the position he held at the time of his recent promotion.

Robert D. Ennis, whose promotion to track supervisor on the Illinois Central, with headquarters at Princeton, Ky., was



announced in the September issue, was born on June 21, 1891, at Lyon County, Ky. He entered railroad service with the I. C. as a section laborer on July 1, 1913, at Eddyville, Ky., and was later advanced to extra gang foreman. He joined the U. S. Navy on May 4, 1918, and 14 months later returned to the I. C. as section foreman. In May, 1945, Mr. Ennis was advanced to general foreman of track on the Kentucky division, and served in that capacity until his recent promotion.

Bridge and Building

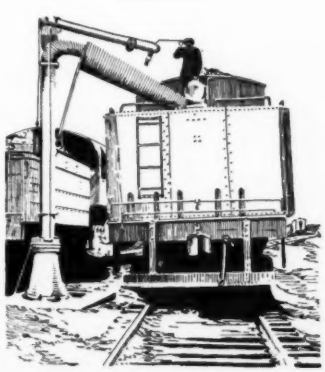
John F. Redmond, supervisor of structures on the New York Central, at Mott Haven, N. Y., retired recently after more than 37 years of service.

Obituary

J. R. Miller, assistant to chief engineer of the Kentucky & Indiana Terminal, died on June 25, at the age of 53.

Albert W. Newton, former chief engineer of the Chicago, Burlington & Quincy, who retired with the title of consulting engineer in February, 1937, died at St. Luke's Hospital, Chicago, on October 11. Mr. Newton was born at Jerseyville, Ill., on January 22, 1867. Prior to entering railroad service he was engaged in general engineering practice and as engineer of the Stony Island levee and drainage district at Pittsfield, Ill. He began his railroad career in September, 1900, with the Chicago & Alton (now Gulf, Mobile & Ohio) as assistant engineer, which position he held at Kansas City, Mo., and Bloomington, Ill. In March, 1903, he joined the Burlington as construction engineer at St. Louis, Mo., and the following year became assistant engineer at Chicago. Later he served as engineer on the Missouri district, with headquarters at St. Louis, subsequently being made general inspector of permanent way and structures in the office of the vice-president at Chicago. Mr. Newton was advanced to assistant to president in 1915, and two years later was promoted to chief engineer in which position he remained until his retirement.

(Please turn to page 1070)



Association News

Roadmasters' Association

A meeting of the Executive committee is scheduled to be held at the Engineers' Club, Chicago, on December 11. The purpose of this meeting is to lay the groundwork for the activities of the ensuing year. The principal item of business on the agenda will be the appointment of committees—chairmen, vice-chairmen and personnel—to conduct investigations and prepare reports on the six subjects that were chosen for study during the year at the close of the recent convention.

American Railway Engineering Association

The most important events on the agenda of the association for November are meetings of the Board of Direction and the Nominating committee, which will meet on the same day, November 10, and of the Arrangements committee which will hold a meeting at association headquarters on November 9.

Only two meetings of technical committees have been scheduled for November. The Committee on Rail will meet in Room 1315, New York Central building, 466 Lexington avenue, New York, on November 16, and the Committee on Waterproofing will meet at Purdue University, LaFayette, Ind., on November 9-10.

Metropolitan Maintenance of Way Club

The first fall meeting of the club was held on October 26, at the Hotel Shelburne, New York, and was featured by a discussion of Power-Ballasting Operations, by A. Price, division engineer, Erie, Jersey City, N. J.

Bridge and Building Association

Following the close of the convention in September, the proceedings of which are reported in detail in this issue, the newly-elected Executive committee held a brief meeting at which the ground was partly laid for the activities of the association for the ensuing year. Another meeting of the Executive committee is scheduled to be held on December 4 at the Engineers' Club, Chicago. The principal item of business on the agenda

Meetings and Conventions

American Railway Bridge and Building Association—Elise LaChance, Secretary, 431 S. Dearborn Street, Chicago 5.

American Railway Engineering Association—Annual Meeting, March 13-15, 1951, Chicago. Neal D. Howard, Secretary, 59 E. Van Buren street, Chicago 5.

American Wood-Preservers' Association—Annual meeting, April 24-26, 1951, Stevens Hotel, Chicago. H. L. Dawson, Secretary-treasurer, 839 Seventeenth Street, N. W., Washington 6, D. C.

Bridge and Building Supply Men's Association—E. C. Gunther, Secretary, 122 S. Michigan Avenue, Chicago 3.

Maintenance of Way Club of Chicago—Next meeting November 27, 1950. E. C. Patterson, Secretary-treasurer Room 1512, 400 W. Madison street, Chicago 6.

Metropolitan Maintenance of Way Club—Secretary, 30 Church street, New York.

National Railway Appliance Association—R. B. Fisher, Secretary; Lewis Thomas, assistant, Secretary 59 E. Van Buren street, Chicago 5.

Railway Tie Association—Roy M. Edmonds, Secretary-treasurer, 610 Shell Building, St. Louis 3, Mo.

Roadmasters' and Maintenance of Way Association of America—Elise LaChance, Secretary, 431 S. Dearborn street, Chicago 5.

Track Supply Association—Lewis Thomas, Secretary, 59 E. Van Buren street, Chicago, 5.

of this meeting will be the appointment of the chairmen, vice-chairmen and personnel of committees to investigate and report on the eight subjects chosen for study at the recent convention.

Maintenance of Way Club of Chicago

With 208 members and guests in attendance the first meeting of the club for the current season was held on October 23 at Eitel's restaurant, Field Building, Chicago. Those present heard an interesting account, illustrated with slides, of the condition and maintenance practices of the German railways five years after the collapse of that country in World War II. The speaker was George M. O'Rourke, assistant engineer maintenance of way, Illinois Central, who, as a member of a group of American railway men commissioned to make a study of the German lines, spent three months in that country observing not only the railroads, but the condition of the cities, and other facilities.

At the next meeting, which will be held on November 27, R. G. Simmons, general roadmaster, Chicago, Milwaukee, St. Paul & Pacific, will speak on the Effect of Modern Track Construction on Track Maintenance.

Supply Trade News

Personal

Koppers Company, Inc., Pittsburg, Pa., has announced the appointment of **Chester R. Austin** as manager of the development section of the research department.

The **Hyster Company,** Portland, Ore., has announced the appointment of **John B. Hall** as railroad representative in Chicago. He will have his headquarters at Peoria, Ill.

Robert F. Moody has been appointed assistant sales manager in the eastern division of the **Hyster Company,** Portland, Ore. Mr. Moody will maintain headquarters in Peoria, Ill.

Oscar von Seeger, export representative of the **Caterpillar Tractor Company,** Peoria, Ill., has been appointed to the new post of assistant divisional manager of the export sales department.

Harold K. Beck has been appointed commercial vice-president, in addition to his present post as manager of the Washington office, of the **Worthington Pump & Machinery Corp.,** Harrison, N. J.

Erwin A. Gorges, assistant manager of the traffic section, Traffic and Transportation department, **Koppers Company, Inc.,** Pittsburg, Pa., has been named manager of the section. He succeeds **Albert A. Mattson,** who died on September 16.

The **Taylor-Wharton Iron & Steel Co.,** High Bridge, N.J., has announced the following appointments: **W. F. Williams** as vice-president, manganese sales; **H. E. Cragin, Jr.,** as assistant vice-president, manganese sales; and **J. P. Reynolds** as assistant sales manager.

D. G. Blattner, has been appointed special representative in engine application for the eastern sales division of the **Caterpillar Tractor Company,** to succeed **M. A. Galvin,** who has resigned. Mr. Blattner formerly was a special representative in the sales development division of the general sales department.

The **General Electric Company** has appointed **James M. McGarry** as manager of advertising and sales promotion for the apparatus department's St. Louis, Mo., office, mid-states district. Mr. McGarry formerly was head of transport industries publicity and handled special publicity assignments in the apparatus department's news bureau in Schenectady, N. Y.

Donald E. Randall has been appointed manager of the Sao Paulo, Brazil branch of the **Independent Pneumatic**

Tool Company, manufacturers of portable power tools. In his new capacity, Mr. Randall will supervise the sales and service of Thor power tools throughout South America. Prior to his appointment, Mr. Randall held the position of service engineer of the company's Chicago branch. The Brazil organization will operate under the name Thor Tool Hemisphere, Inc. In addition, the company has announced the formation of Thor Tool Continental, Inc., at Antwerp, Belgium, under the direction of **Vance G. Turner.** Mr. Turner for the past three years has been Thor western Europe export representative of the company, with headquarters in Brussels, Belgium.

J. R. Munro

C. A. Woodley

J. R. Munro, general factory manager of the **Caterpillar Tractor Company,** Peoria, Ill., has been appointed to the newly created position of director of manufacturing. **C. A. Woodley,** assistant general factory manager, succeeds Mr. Munro. Appointed assistant general factory managers are **W. L. Naumann,** formerly production manager, who will supervise production, planning and tooling, metallurgy and heat treat activities, and **Lloyd J. Ely,** heretofore manager of the Diesel engine factory, who will direct activities in the foundry, engine factory, tractor factory and steel fabrication factory.

Mr. Munro was born within a few blocks of the company's San Leandro (Cal.) plant. He joined Caterpillar in 1918 as an apprentice, and in 1931 was transferred to Peoria. He became assistant superintendent of engine and tractor assembly in 1933, and the following year was appointed superintendent of Diesel engine assembly and testing. Mr. Munro was made factory manager of the entire tractor and engine division in 1936, and has served as general factory manager since February, 1942.

Mr. Woodley joined Caterpillar in 1926, also as an apprentice. He was promoted to machine shop foreman in 1934, and in January, 1945, became assistant general factory manager.

Mr. Naumann was graduated from the Caterpillar apprentice school in 1933, and was appointed assistant factory manager in 1942. He was advanced to factory manager in January, 1945.

Associated with Caterpillar since 1916, when he served in the tool delivery section, Mr. Ely served as general foreman of the machine shops, assistant superintendent of buildings and assistant factory manager of road machinery. In 1942 he was appointed works manager of the Caterpillar Military Engine Company at Decatur, Ill., and in 1945 spent several months with the Corps of Engineers in Europe. Mr. Ely was appointed manager of Caterpillar's new Diesel engine factory in 1947.

Alfred C. Laessig, general manager of the Tool Division of **Hubbard & Co.,** Pittsburgh, Pa., has been promoted to vice-president. At the same time he became vice-president of the **Unit Rail Anchor Company**—a Hubbard subsidiary. Mr. Laessig began his business career in 1917 with the New York Central. Later he transferred to the Delaware, Lackawanna & Western, serving in various capacities in the engineering department until 1925, when he became associated with the Verona Tool Works. Mr. Laessig joined the Hubbard organization in June, 1945, as Chicago district

Alfred C. Laessig

sales manager. He was promoted to general manager of the Tool division later the same year.

R. K. Mangan, executive vice-president of the **Buda Company** for the past 12 years, has been elected president, to succeed the late **J. S. Dempesy,** who died on August 17. **K. E. Fitzpatrick,** secretary, has been appointed to succeed Mr. Dempesy as treasurer.

Formation of the **Power Ballaster Products Division** as a full-fledged operating division of the **Pullman-Standard Car Manufacturing Company** has been announced by Wallace N. Barker, executive vice-president of Pullman-Standard. The organization of this new division, with its own sales and engineering departments, was accomplished by **John A. Curtis,** who has been appointed manager of the new division. In his announcement, Mr. Barker said that it was

John A. Curtis

the intention of Pullman-Standard to extend its activities in the railroad track maintenance field. The Power Ballaster Products Division, with manufacturing facilities at Hammond, Ind., now has on the market a power ballaster, a power cribber and a ballast cleaner.

As head of the new division, Mr. Curtis will coordinate expansion of sales, design engineering of new products, and field engineering and service. He was formerly associated with the Capehart-Farnsworth division of the International Telephone & Telegraph Co., as manager of its railroad equipment division. In that post he was credited with pioneering very high frequency radio equipment for railroads and was instrumental in securing assignment by the Federal Communications Commission of the exclusive communication channels necessary for its expansion.

F. H. Philbrick, founder of the original Power Ballaster Company, which was purchased by Pullman-Standard several years ago, will continue to serve as consultant on improvement of present products and development of new ones.

The **Air Reduction Company, Inc.,** New York, has announced the appointment of **Dr. E. R. Blanchard** as assistant manager of the research division. Dr. Blanchard, a graduate of Amherst, obtained a masters degree at Harvard University and a Ph. D. degree at Johns Hopkins University. From 1935 to 1943, he was an associate professor at the latter university and later worked on the Manhattan Project. Dr. Blanchard joined Air Reduction in 1946 as a physicist and technical consultant.

Obituary

John T. DeMott, treasurer and a director of the **Simmons-Boardman Publishing Corporation,** publishers of **Railway Engineering and Maintenance** and other transportation periodicals, died on September 15 at his home in Larchmont, N. Y., following a long illness.

Edward W. Kavanagh, manager sales and service, Railway division, Southern region, of the Manganese Steel Forge Company, Pittsburgh, Pa., died on September 3, after a short illness.

Chester A. Orr, chairman of the board of the Union Metal Manufacturing Company, Canton, Ohio, died on October 10, at the age of 67. A native of Syracuse, N. Y., Mr. Orr was graduated from the Case School of Applied Science in 1905. After a varied industrial career,

(Continued on page 1074)

Supply Trade News (Cont'd)

Chester A. Orr

he became associated with Union Metal in 1925 as vice-president and general manager. He was named president in 1926, and became chairman of the board in 1937.

Trade Publications

(To obtain copies of any of the publications mentioned in these columns, use postcards, page 999)

Timber Tongs—The Mack Welding Company has issued a new catalog sheet describing, with specification, the three different types of Mack safety toggle tongs for use in handling ties, bridge timbers, poles and similar materials.

Hardfacing Alloys—The Air Reduction Sales Company has announced a 20-page illustrated catalog presenting detailed information on the complete Airco line of hardfacing alloys, including typical uses, mechanical properties, chemical analysis and a brief outline of recommended procedures.

Allis-Chalmers Pumps—A wide variety of pumping units is cataloged in a new 16-page "Handy Guide to Selection of Centrifugal Pumps" released recently by the Allis-Chalmers Manufacturing Company. Included in the catalog are head capacity charts and tables for the various types of pumps, along with data on sizes, capacities and construction features.

Golden-Anderson Valves—The Golden-Anderson Valve Specialty Company has released three new bulletins presenting data of interest to valve users. One of these (No. W-1) describes cushioned swing check valves for preventing back flow. The second (No. W-2) is devoted to cushioned surge-relief valves for protecting water lines against excessive pressures caused by surges in the system. The third (No. S-1) describes triple-acting non-return valves. Each bulletin contains drawings of the valves, installation and operation data, and specifications.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, AND CIRCULATION REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946

Of Railway Engineering and Maintenance published monthly at Chicago, Ill. for October 1, 1950.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Simmons-Boardman Publishing Corporation, 79 West Monroe St., Chicago 3, Ill.; Editor, Merwin H. Dick, 79 West Monroe St., Chicago 3, Ill.; Managing Editor, None; Business Manager, John R. Thompson, 79 West Monroe St., Chicago 3, Ill.

2. That the owners are: Simmons-Boardman Publishing Corporation, 30 Church Street, New York 7, N. Y.; Stockholders of 1 per cent or more of the total amount of stock are: Mrs. I. R. Simmons, New Rochelle, N. Y.; S. O. Dunn, 79 W. Monroe St., Chicago, Ill.; Mrs. C. E. Dunn, 3500 Lake Shore Drive, Chicago, Ill.; Mrs. Mae E. Howson, 6922 Paxton Ave., Chicago, Ill.; Ella L. Mills or Catherin S. Mills, Westfield, N. J.; Mrs. E. G. Wright, 398 No. Walnut St., East Orange, N. J.; Mrs. E. H. Thompson, East Cleveland, Ohio; Mrs. Maude E. Slate, Summit, N.J.; Mrs. Ruth W. Johnson, 1615 Ravenna Blvd., Seattle, Wash.; J. V. McManus, 39 Broadway, New York, N. Y.; J. Streicher & Co., 2 Rector St., New York, N. Y.; Partners of J. Streicher & Co., are: Joseph Streicher; Jack L. Streicher; Ethel Streicher; Judson L. Streicher, all of 2 Rector Street, New York, N. Y.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

M. H. DICK Editor

Sworn to and subscribed before me this 29th day of September, 1950.

(SEAL) RALPH E. WESTERMAN, Notary Public

(My commission expires February 3, 1953.)

ALPHABETICAL INDEX TO ADVERTISERS, NOVEMBER, 1950

"HIGHBALL" THROUGH MAINTENANCE JOBS WITH COST-CUTTING BLUE BRUTES

...Like this feature-filled track-team

Here's expertly engineered portability that will save you time and dollars on every job. The light, strong Blue Brute Hand-I-Air has ❶ 600x16 pneumatic tires for easy riding over right-of-way shoulders . . . ❷ adjustable dolly wheels for single-rail use . . . ❸ telescoping handle bars that act as bumpers during shipping . . . and ❹ a lifting bale for quick hoisting. In action, there's push-button control . . . Worthington Feather* Valves for continuous, maximum air delivery . . . while ❺ the Automatic Fuel Saver regulates engine speed to air consumption, reducing wear, prolonging compressor-life.

You'll hang up high speed surfacing records when you hook up these Blue Brute team-mates – 4 WTT-17 Tie Tampers. Easy-handling 42-pounders, they are packed with hard-slugging power and kept at peak by ❻ foolproof, built-in lubrication which feeds a constant film of oil to piston and cylinders . . . ❼ positive locking throttle control with dust-proof replaceable bushing for low-cost maintenance . . . ❽ replaceable, hardened nickel steel throttle valve bushing providing leak-proof seat . . . ❾ adequate freeze resistant exhaust opening . . . and ❿ independent venting of cylinder, allowing piston hammer to strike harder.

Investigate the many Blue Brute combinations you can team up for faster, better, lower-cost performance on track, bridge and building work. Write for further facts proving there's more worth in a Blue Brute.

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*Reg. U. S. Pat. Off. HB-8

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